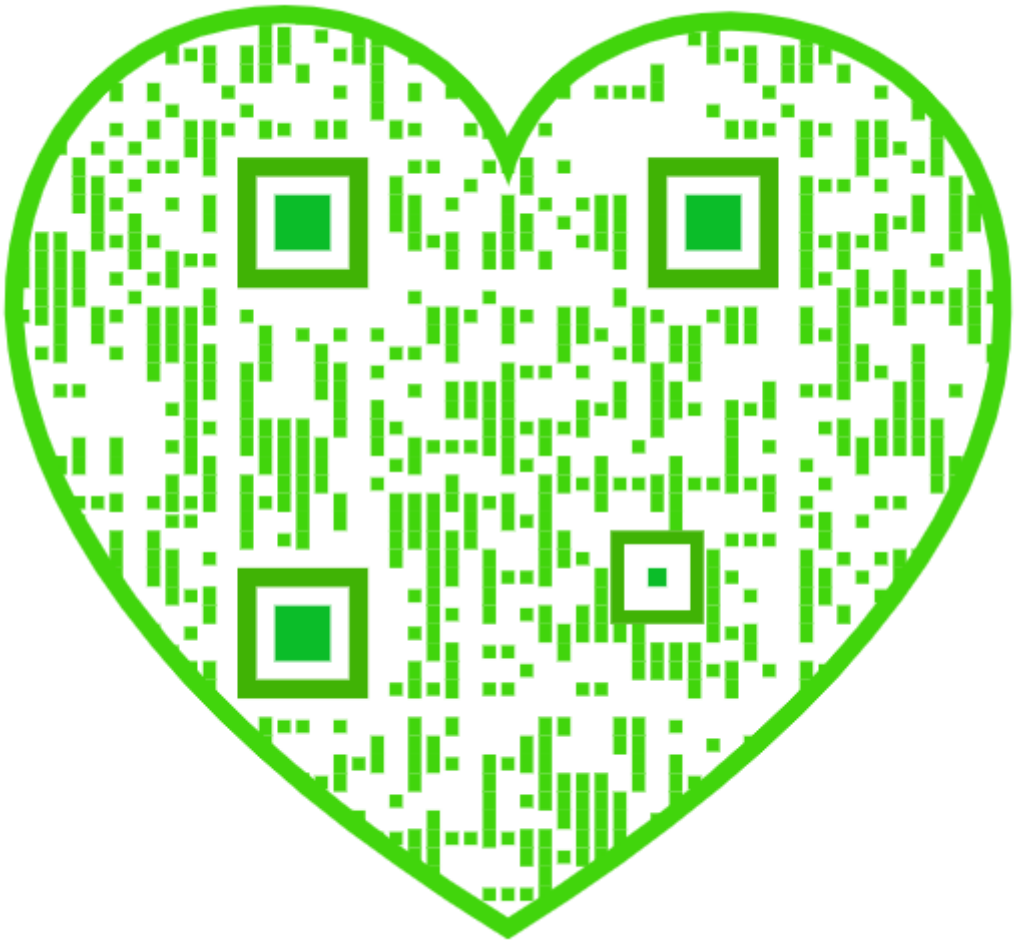

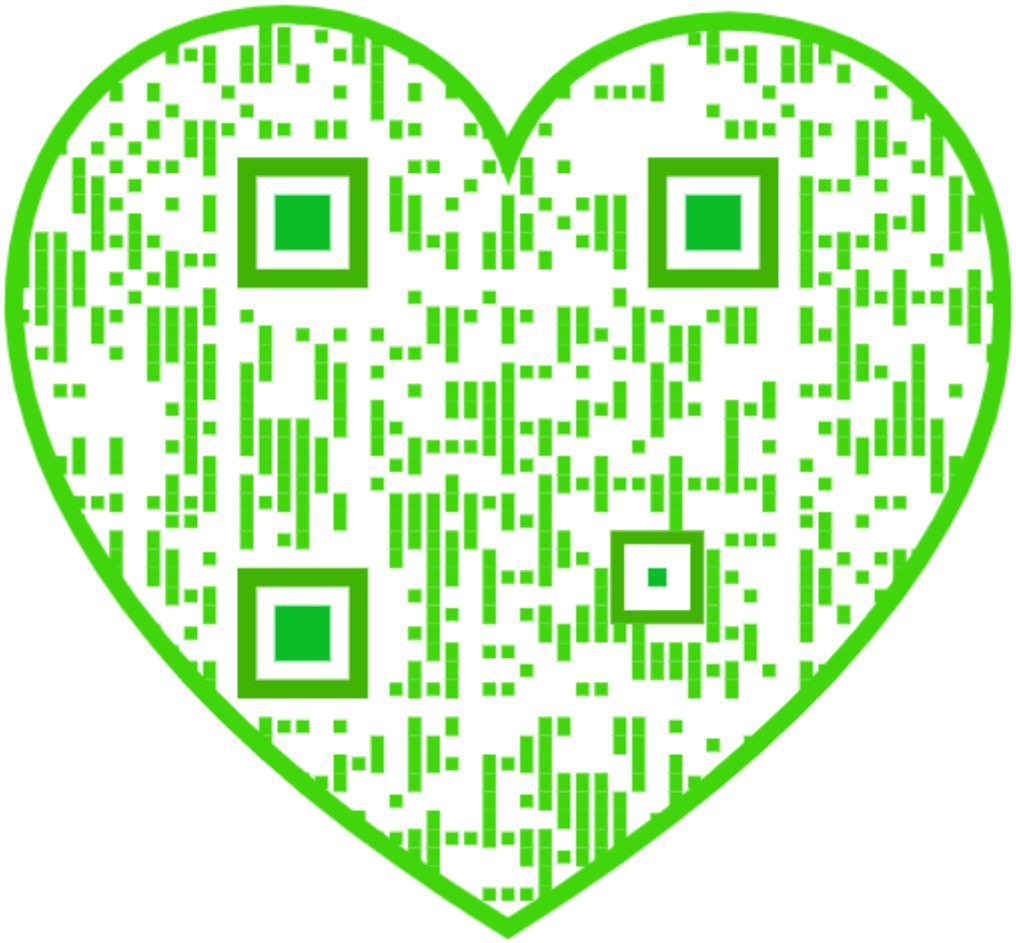

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Book .N3

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SAFETY
IN
WOODWORKING

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FOREWORD

The standards, illustrations and explanatory notes presented herein are intended primarily for the information of employers and employees engaged in the woodworking industry, but as wood in some form enters into plant maintenance, if not into the actual manufacturing operations, of most industrial establishments, practical information and advice with regard to safeguarding woodworking machines should be of very general value.

The illustrations of guards are made from photographs of devices in actual service; they are, therefore, in themselves an indication that these devices are practical rather than purely theoretical.

The volume is assembled in looseleaf form in order to make it possible to insert additional pages from time to time as new matter is obtained; the looseleaf form also allows for the withdrawal of matter that has become obsolete.

The National Workmen's Compensation Service Bureau acknowledges the assistance of the many manufacturers and others who have helped in the preparation of this book.

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SECTION I

GENERAL PRINCIPLES AND STANDARDS

FUNDAMENTAL PRINCIPLES

In the prevention of accidents incidental to the operation of woodworking machines, the following fundamentals should be considered:

LOCATION

LAY OUT. In planning the lay out of plant care should be taken to so place the machines that the routing of material, from raw stock to finished product, will be in a forward direction and with no crossing of paths by which material is routed.

WORKING SPACE. The machines should be located in a safe working space. It is important that the machines be properly spaced to avoid interference among the workmen handling stock or material.

ILLUMINATION. The location of the machines should be planned so that there will be sufficient daylight at points of operation. In placing artificial lights, care should be taken to have the workroom illuminated as well as to have ample light upon the machines and the material.

VIBRATION. Woodworking machines invariably run at a high speed and, whether of the revolving or reciprocating type, are likely to cause excessive vibration. For this reason those machines having the greatest vibration should be installed on the ground floor of the mill or workshop if possible and secured to a substantial foundation or floor.

FLOORS. The floors should be even to prevent tripping and the operators' standing spaces should be covered with non-slipping material.

EXHAUSTS. Dust and waste materials accumulate rapidly in most woodworking establishments, and it is important that provision be made for the prompt and constant removal of this element of danger. A spark in a dust-laden room may cause a catastrophe the extent of which it is impossible to estimate. Suction exhausts, blowers and mechanical conveyors are particularly efficient for the prompt disposal of waste material.

PROPER MACHINES

VARIETY OF MACHINES. Machines should be used on work and material for which they were designed.

While many woodworking machines accomplish a variety of operations satisfactorily, it is difficult to provide effective guards for the point of operation on such machines. Hence, the necessity arises of removing, adjusting and changing special guards and devices for each operation, which in itself introduces an additional hazard. Wherever practicable, a machine should be selected and guarded for a specific operation and other work of a different character, involving special hazards, should be assigned to other machines suitable for the work. This may require additional machinery, but usually the cost is more than offset by the economy in time required to change the setting of machines and the delay it necessitates if the shop is at all busy.

STARTING AND STOPPING MACHINERY

STOPPING MACHINERY. Immediately on finishing an operation the machines should be stopped. For this purpose starting and stopping devices readily accessible to the operator should be provided and well maintained.

ACCIDENTAL STARTING. To prevent the accidental starting of a machine, provision should be made for securing in a fixed position the stopping device or mechanism.

MACHINE OPERATORS

Operators should be selected for their fitness as regards carefulness, quick perception and appreciation of the hazard, good vision, resistance to fatigue, and enthusiasm and enjoyment in the performance of their duties. Beginners and apprentices should receive thorough instruction and training before being permitted to operate machines, and if no special aptitude is shown, they should be assigned to bench or yard work where there is no machine hazard. None but authorized and experienced persons should be permitted to operate machines.

Operators of machines must be persons who will not only look out for the safety of themselves, but for the safety of their fellow workmen.

SAFEGUARDS

LOCATION. Machines should be made safe by being provided with safeguards at points of operation, and all gears, sprockets, chains, belts, pulleys, clutches, wheels, shafting, spindles, couplings, counterweights and other revolving and reciprocating parts or projections should be guarded in accordance with the standards given on pages 6-10.

MATERIAL. It is recognized that operators of woodworking plants naturally prefer to use wood in making their own safeguards. These, however, to some extent increase the fire hazard by accumulating dust and becoming saturated with oil. Metal guards are more durable and the first cost, while somewhat in excess of home-made wooden guards, should not prejudice the employer in selecting that which is most permanent and effective.

OILING AND ADJUSTING. As the high speed of woodworking machines necessitates frequent attention to bearings, it is necessary that safeguards be designed for convenience in oiling and adjusting. Permanent non-removable guards are desirable.

ELECTRICAL EQUIPMENT

In the electrically driven plant we have another element of danger not found in those driven by steam or water. The protection of the workmen against shocks or injury from electrical equipment, as well as the hazard of fire due to electric sparks, should be given careful consideration.

There are a number of safety switches now on the market which have their live parts entirely enclosed and are operated by a lever or button outside the case. Such switches practically eliminate both the danger of accidental contact and that of fire.

Motors should be protected by proper enclosures, and wiring should comply with the rules of the National Electrical Code. No exposed terminals should be permitted about machinery where there is a possibility of workmen coming in contact with same or where there is danger of some metallic substance causing a short circuit.

INDUSTRIAL STANDARDS

The following Industrial Standards have been adopted and are used by the National Workmen's Compensation Service Bureau; they describe the proper material, construction and position of mechanical safeguards. While these standards are applicable to most conditions ordinarily encountered in actual practice, it is understood that special treatment and consideration must be given the unusual and exceptional conditions peculiar to certain industrial establishments.

Some of the illustrations, it will be noted, show guards which do not fully comply with the standards as given in this section. Where we were unable to show machines with guards fully up to standard, we have noted such conditions and explained in what respect they are substandard.

GENERAL STANDARDS

RAILINGS

(1) Railings shall be not less than forty-two (42) inches in height and shall be provided with intermediate rail between the top rail and the floor, and shall be constructed in a permanent and substantial manner, smooth and free from protruding nails, bolts and splinters.

(2) If constructed of pipe, they shall be not less than one and one-quarter (1¼) inches nominal inside diameter.

(3) If constructed of structural metal or bars, their section shall be at least equal in strength to that of one and one-half (1½) inches by one and one-half (1½) inches by 3/16 inch angle iron.

(4) If constructed of wood, the posts shall be not less than two (2) inches by four (4) inches or its equivalent section. Top railings shall be not less than two (2) inches by four (4) inches, or one (1) inch by four (4) inches provided another board of not less than one (1) inch by four (4) inches is securely nailed to sides of posts and to top rail. Center railings shall be not less than one (1) inch by four (4) inches.

(5) Posts and uprights shall be spaced not more than eight (8) feet apart.

(6) The rails, when of metal shapes, metal bars or wood, should be placed on that side of the posts which will afford the greatest support and protection.

(7) Where panels are fitted with substantial expanded metal or wire mesh the middle rails may be omitted.

TOEBOARDS

Standard toeboards shall be three (3) inches high, preferably six (6) inches high, of wood, metal, or other substantial material. Metal grille not exceeding one (1) inch in mesh or the equivalent thereof shall be accepted.

MACHINES

All machines shall be provided with an effective starting and stopping device such as an individual belt shifter, clutch, switch or valve which will effectively control the machine.

(1) (a) GEARS, SPROCKETS AND FRICTION DRIVES shall be completely enclosed or have a band guard around face of gear, with the side flanges extending inward beyond root of teeth. Guards shall be of substantial construction securely fastened in place.

(b) Where a guard or enclosure is within four (4) inches of the gears and there are openings through the guard more than one-half (½) inch in width, through which fingers might project and be injured by the gears, such openings shall be completely covered or protected by substantial material, such as wire netting of not more than one-half (½) inch mesh, with wire not smaller than No. 20 gauge U. S. Standard.

(2) (a) BELTS AND PULLEYS "EXPOSED TO CONTACT" shall be completely enclosed or effectively guarded. Guards shall be of substantial construction, securely fastened in place.

(b) Where guard or enclosure is within four (4) inches of belt, and there are openings through guard more than one-half (½) inch in width, through which fingers might project and be injured by belt and pulley, such openings shall be completely covered or protected by substantial material, such as wire netting of not more than one-half (½) inch mesh, with wire not smaller than No. 20 gauge U. S. Standard.

(c) If guards are within four (4) inches of belt and pulley they shall be not less than six (6) feet in height.

(d) If guards are more than four (4) inches distant from belt and pulley they shall be not less than five (5) feet in height. Such guards if constructed of wire mesh shall not have openings larger than two (2) inches in size and the wire shall not be less than No. 12 gauge U. S. Standard.

(e) Any panel in a guard exceeding forty-two (42) inches in width shall be supported across its width.

(f) A Standard rail placed not less than fifteen (15) inches nor more than twenty (20) inches horizontally from any point of the belt shall be accepted.

(g) Where standard railings are used to guard inclined belts, the vertical clearance between the lower run of the belt and floor shall be not less than six (6) feet six (6) inches at any point where railings pass under the belt.

(h) Overhead horizontal belts with lower part seven (7) feet or less from floor or platform level shall be guarded on sides and bottom.

(i) Inclined belt guards should be so installed that the vertical clearance between the lower run of the belt and the floor shall not be less than six (6) feet six (6) inches at any point outside of guard.

(3) (a) WHEELS, SHAFTING, SPINDLES, COUNTERWEIGHTS, REVOLVING AND RECIPROCATING PARTS, AND OTHER SIMILAR PARTS (EXCLUDING POINT OF OPERATION), EXPOSED TO CONTACT, shall be completely enclosed or effectively guarded. Guards shall be of substantial construction, securely fastened in place.

(b) Where guard or enclosure is within four (4) inches of such part, and there are openings through guard more than one-half (½) inch in width, through which fingers might project and be injured, such openings shall be completely covered or protected by substantial material, such as wire netting of not more than one-half (½) inch mesh, with wire not smaller than No. 20 gauge U. S. Standard.

(c) If guards are within four (4) inches of moving parts, they shall be not less than six (6) feet in height.

(d) If guards are more than four (4) inches distant from moving parts, they shall be not less than five (5) feet in height. Such guards, if constructed of wire mesh, shall not have openings larger than two (2) inches in size, and the wire shall be not less than No. 20 gauge U. S. Standard. Slatted guards, if used, shall not have openings greater than one (1) inch in width.

(e) A Standard rail placed not less than fifteen (15) inches, nor more than twenty (20) inches, horizontally from the moving parts shall be accepted. Paragraph (g) above also applies.

(4) Clutches, couplings, set screws, bolts, keys, oil cups or similar projections unless enclosed by the housing of the machine, shall be made flush, or protected with cylindrical safety sleeves, or completely enclosed.

(5) Guards shall be of substantial construction securely fastened in place.

(a) The uprights used for support should be of angle iron 1"x1"x⅛", to 1½"x1½"x3/16", iron pipe ¾" to 1½" inside diameter, or construction of equivalent strength, the sizes varying between the above limits according to the weight, size and location (collisions with moving equipment) of guard.

(b) The filling material should be fastened to the supports by one of the following methods:

To Angle Iron Support—

By means of ¾"x⅛" flat iron fastened to the angle by using 3/16" bolts or rivets, placed at intervals not exceeding ten (10) inches; or by wooden strips 1"x1" fastened to the angles by means of 3/16" bolts; or by other method providing equivalent strength.

Perforated or solid sheet metal may be bolted or riveted directly to the angle, or may be spot welded to the same.

To Piping—

By means of clamps or by heavy wire fastenings placed on the inside of the guard.

GENERAL RULES

(1) "EXPOSED TO CONTACT" shall mean such location of a dangerous moving part as will permit contact with same by any person. The following shall be considered "EXPOSED TO CONTACT":

Gears and sprockets, set screws and similar projections wherever located, if not completely encased by the housing of the machine or by guards which conform to Standards.

All other dangerous moving parts when located within six (6) feet of floor or working platform, if not protected by housing of the machine, or by fixed adjacent equipment.

Note:—Balconies or runways on machines are considered working platforms in connection with this term.

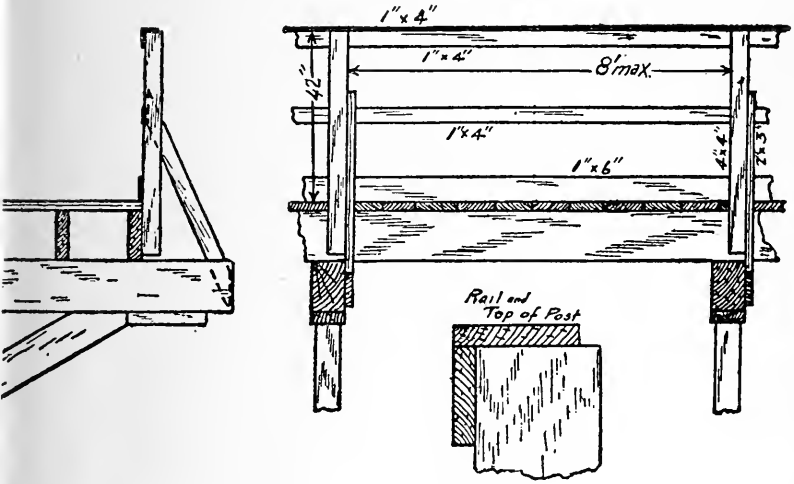
(2) Where machine parts (other than gears, sprockets, set screws and similar projections) are so located with respect to walls, other equipment or other machines that they are as effectively protected as if guarded in accordance with above Standards they shall be so considered.

CONSTRUCTION OF GUARDS

Guards for gears, belts, pulleys and other dangerous moving parts should be so constructed as not to impair the efficiency of the machines. In many cases frequent adjustment of guarded parts is necessary, and unless guards are designed with this condition in mind, adjustments entail considerable loss of time and the workmen may even neglect to replace such guards after adjustments have been made. Shop rules usually specify that all guards must be in place when machine is in use, but such rules are not always adhered to.

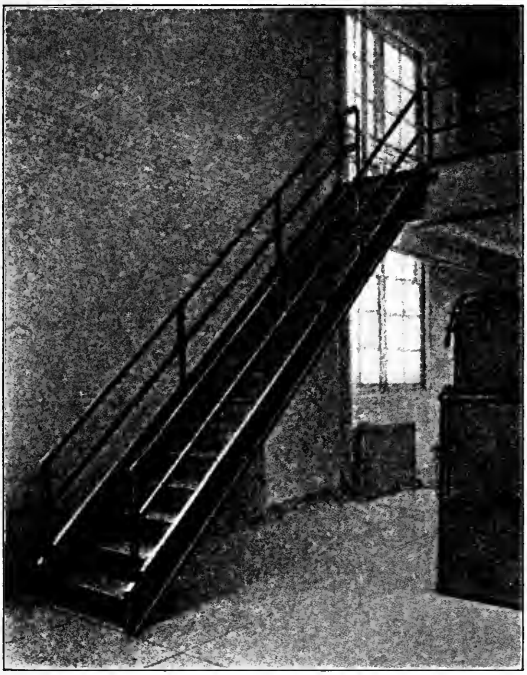
Panel or sectional construction, especially where metal guards are used, makes guarded parts readily accessible, since sections may be hinged or held in place by clips or hooks. Hinges are preferable, as they prevent the complete removal of guards. Guards in Section V, page 31, and Section IX, page 11, illustrate hinged type of construction.

Where guards do not necessarily extend to the floor, it is recommended that they be attached to an integral part of the machine if possible, rather than supported from the floor. This permits easy cleaning underneath and eliminates a possible tripping hazard.



STANDARD WOOD RAILING

See page 6 for description of various types of railings.



STAIRS

Stair hand rails should be 36 inches high, measured vertically from center of tread.

Hand rails should be provided on

All open sides.

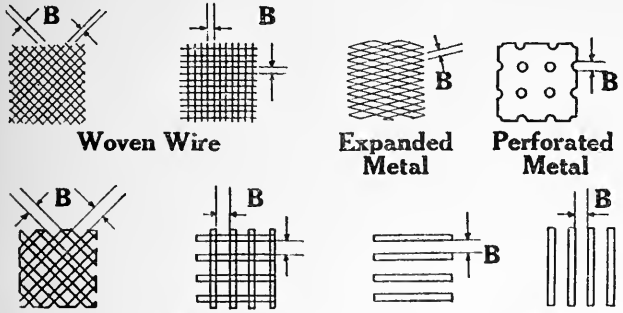
One side of enclosed stairway 4 feet or less in width.

Both sides of enclosed stairway over 4 feet in width between walls.

Both sides and in center of stairway over 8 feet in width between walls.

Stair treads should be firmly secured and kept in good repair.

MESH FOR GUARDS

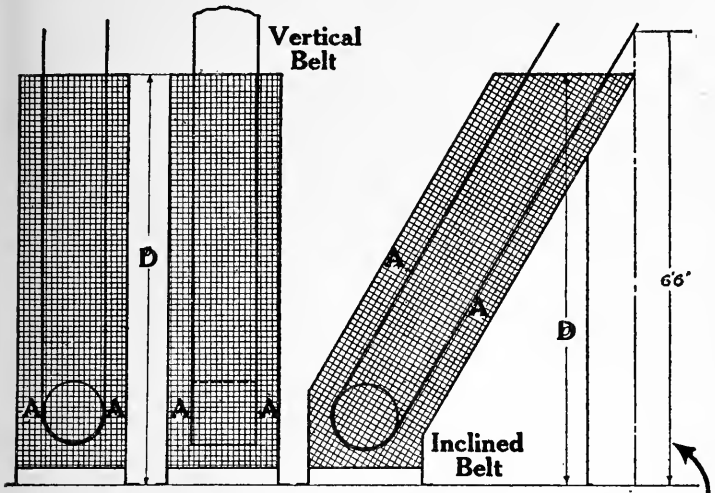


Woven Wire | **Expanded Metal** | **Perforated Metal**

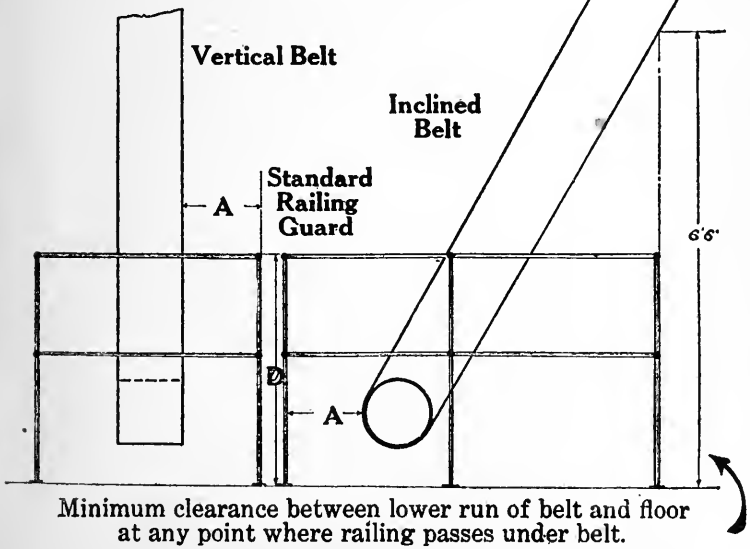
Wood or Metal Strip Crossed | **Wood or Metal Strip Not Crossed**

Material	A Clearance from Belt at all Points	B Largest Mesh or Opening Allowable	C Minimum Gauge (U. S. Stand.) or Thickness	D Min. Height of Guard from Floor or Platform Level
Woven Wire	Under 4″	½″	½″—#20	6′—0″
	4″—15″	2″	2″—#12	5′—0″
Expanded Metal	Under 4″	½″	½″—#18	6′—0″
	4″—15″	2″	2″—#13	5′—0″
Perforated Metal	Under 4″	½″	½″—#20	6′—0″
	4″—15″	2″	2″—#14	5′—0″
Sheet Metal	Under 4″	—	#22	6′—0″
	4″—15″	—	#22	5′—0″
Wood or Metal Strip Crossed	Under 4″	½″	Wood ¾″ Metal #16	6′—0″
	4″—15″	2″	Wood ¾″ Metal #16	5′—0″
Wood or Metal Strip Not Crossed	Under 4″	½″ width	Wood ¾″ Metal #16	6′—0″
	4″—15″	1″ width	Wood ¾″ Metal #16	5′—0″
Std. Rail	Min. 15″ Max. 20″	See Standard for Railings (p. 6)		

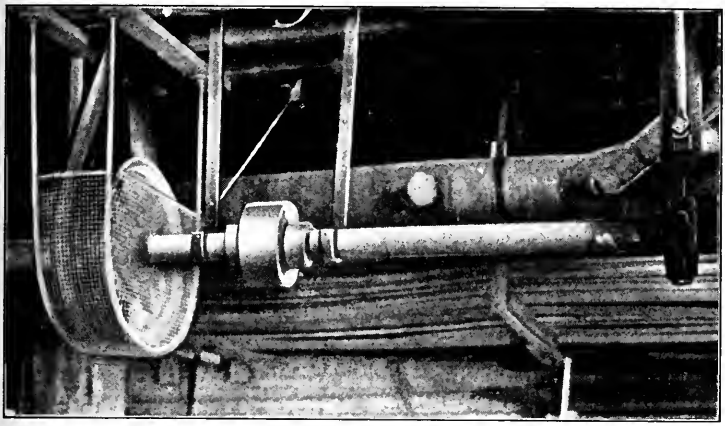
BELT GUARDS



Minimum clearance between belt and floor at any point outside of guard.



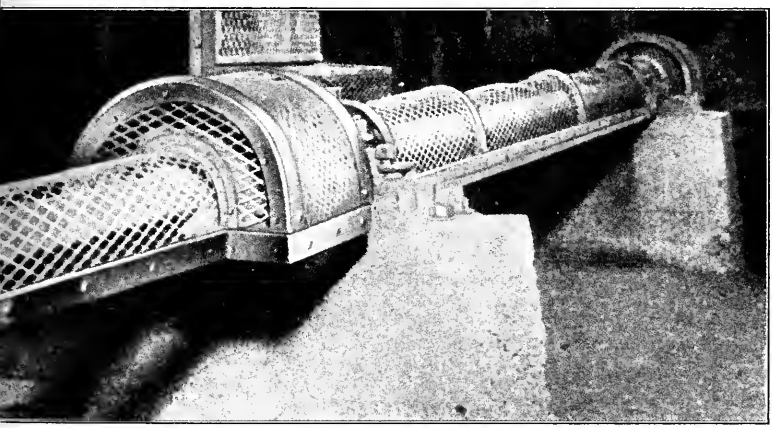
Minimum clearance between lower run of belt and floor at any point where railing passes under belt.



OVERHEAD SHAFT GUARD

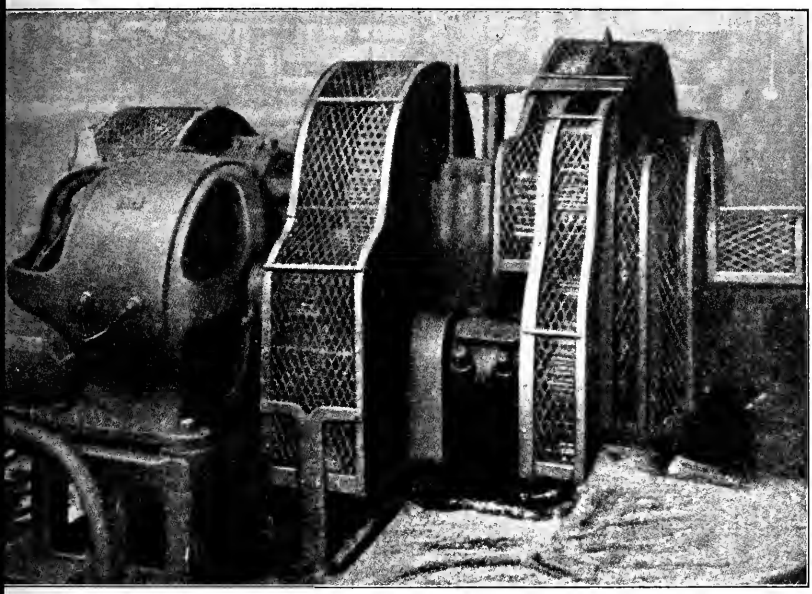
Shafting and coupling completely covered by metal guard supported from ceiling.

Note also the substantial mesh guard for belt and pulley.



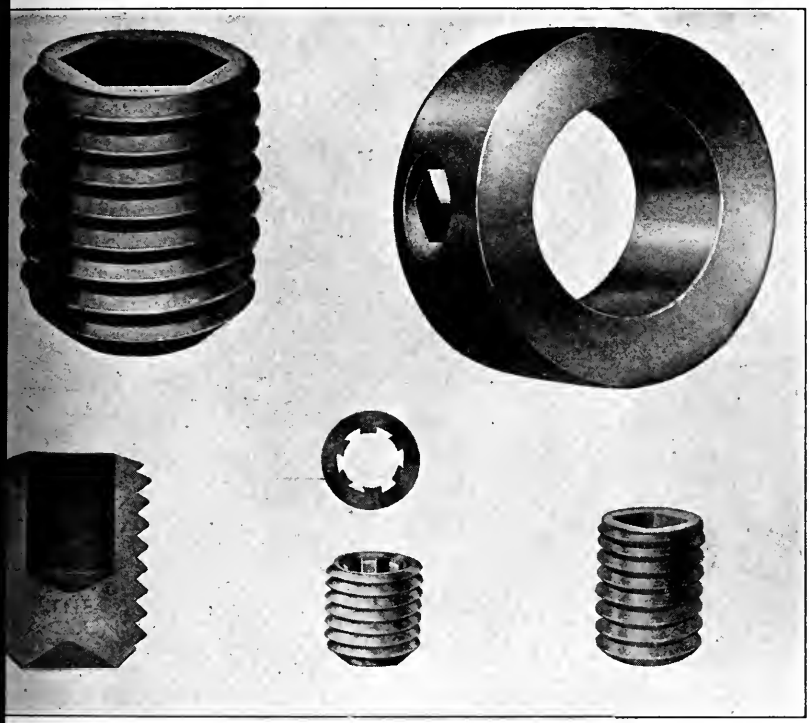
SHAFT GUARD

Well-designed guard for line shaft located near floor.



GEAR GUARDS

Substantial guards for transmission gears.



SAFETY SET SCREWS

Above are shown several types of safety set screws. Set screws which project beyond collar should never be used.

SAFETY ORGANIZATION

The guarding of machinery is only the first step toward preventing accidents. The employee who constantly thinks safety is seldom injured. Getting him interested in safety is accomplished by education. The best method of educating the employee is through a live safety organization.

The prevention of accidents has a direct bearing on the amount of time lost by employees. Aside from the direct cost of the accident, it is frequently necessary, when a man is injured, to break in a new man to take his place. This may mean the waste of material as well as a decrease in production. It is an undisputed fact that the efficiency of the employee increases in proportion to the improvement made in working conditions. Safety organization, therefore, not only serves as a means for educating the employee and bettering his working conditions, but also promotes co-operation between employer and employee.

The following plan has been adopted by the Bureau in its Industrial Standards. This plan to be most effective should receive the co-operation of both employer and employee and should be carried out in spirit as well as letter. The importance of such an organization cannot be too strongly emphasized. If conscientiously conducted, it will go far toward eliminating accidents in the plant.

GENERAL RULES

Safety Organization Records shall be kept in such a manner that the rating inspector can readily determine the number and character of recommendations submitted, carried out, under progress, and not acted upon. This can readily be accomplished by noting at the end of each month or other convenient interval not to exceed three months—

I. The number of new recommendations made.

II. The number of recommendations carried out.

III. The number of recommendations which are uncompleted.

IV. The number of recommendations which have not been begun.

SUPERVISION

(CLASS A, 1-150 EMPLOYEES)

STANDARD

(1) There shall be a General Committee, consisting of not less than three (3) persons, one of whom shall be selected from the following:

Manager,
Superintendent,
Engineer,
Master Mechanic,
Foreman,

or other employee in a position of authority. The Committee shall:

I. Review and approve inspection reports.

II. Pass on all recommendations to determine their practicability. For this purpose, meetings shall be held at intervals of not more than one (1) month, and written records of such meetings shall be kept.

III. Record and familiarize themselves with the cause of all accidents for the purpose of devising methods which shall tend to eliminate similar accidents.

IV. See that new employees are properly instructed as to the hazard of their work, and that employees of the different departments are educated in safety practices through the use of bulletins, printed rules or oral instructions.

V. Supervise the safety inspection work.

(CLASS B, 151-500 EMPLOYEES)

(2) There shall be a General Committee consisting of not less than three persons, one of whom shall be selected from the following:

Manager,
Superintendent,
Engineer,
Master Mechanic,
Foreman,

or other employee in a position of authority. The Committee shall:

I. Review and approve inspection reports.

II. Pass on all recommendations to determine their practicability. For this purpose, meetings shall be held at intervals of not more than one (1) month, and written records of such meetings shall be kept.

III. Record and familiarize themselves with the cause of all accidents for the purpose of devising methods which shall tend to eliminate similar accidents.

IV. See that new employees are properly instructed as to the hazard of their work, and that employees of the different departments are educated in safety practices through the use of bulletins, printed rules or oral instructions.

V. Supervise the safety inspection work.

VI. See that drawings and specifications for new machinery cover the guarding of dangerous features, such as gears, sprockets and couplings. Inspect new machinery before it is placed in operation and see that necessary safeguards (including point of operation) are provided.

(CLASS C, MORE THAN 500 EMPLOYEES)

(3) There shall be a General Committee of not less than three (3) persons, one of whom shall be selected from the following:

Manager,
Superintendent,
Engineer,
Master Mechanic,
Foreman,

or other employee in a position of authority. The Committee shall:

I. Review and approve inspection reports.

II. Pass on all recommendations to determine their practicability. For this purpose, meetings shall be held at intervals of not more than one (1) month, and written records of such meetings shall be kept.

III. Familiarize themselves with the cause of all accidents for the purpose of devising methods which shall tend to eliminate similar accidents.

IV. See that new employees are properly instructed as to the hazard of their work, and that employees of the different departments are educated in safety practices through the use of bulletins, printed rules, or oral instructions.

V. Supervise the safety inspection work.

INSPECTION SERVICE

(CLASS A, 1-150 EMPLOYEES)

STANDARD

(1) There shall be some competent person with knowledge of Industrial Safety Standards in charge of inspection service, who shall make regular weekly inspections of the plant.

Such persons shall fill out and sign weekly reports showing conditions of the plant and recommendations for changes. These reports shall be kept on file in the office and shown to the inspector. Standard blanks for inspection reports shall be furnished by the insurance carrier.

The Safety Inspector in charge of safety shall:

I. Follow up general lines of outstanding safety work and record same.

II. Make or arrange for regular inspections of special equipment, such as elevators, cranes, engine and motor stops, etc., and shall keep written records of each inspection.

III. Look after fire conditions, extinguishers, filling of fire (water and sand) pails, and keeping exits clear.

IV. See that drawings and specifications for new machinery cover the guarding in accordance with standards of dangerous features, such as gears, sprockets and couplings. Inspect new machinery before it is placed in operation and see that necessary standard safeguards are provided.

(CLASS B, 151-500 EMPLOYEES)

(2) There shall be some competent person with knowledge of Industrial Safety Standards in charge of inspection service, who shall make regular weekly reports showing conditions of the plant and recommendations for changes. These reports shall be kept on file in the office and shown to the Rating Board or Bureau inspector. Standard blanks for inspection reports shall be furnished by the insurance carrier. The Safety Inspector shall:

I. Inspect for maintenance of safeguards, general order and arrangement of materials, cleanliness and lighting.

II. Look after fire conditions, extinguishers, filling of fire (water and sand) pails, and keeping exits clear.

III. Investigate, record and report on all accidents.

IV. The General Committee shall make not less than one (1) thorough inspection of the plant each month, and submit written reports of recommendations for safeguarding or approved safety conditions which they consider desirable, which reports shall be signed by members of the Committee.

(CLASS C, MORE THAN 500 EMPLOYEES)

(3) (a) There shall be a Safety Inspector who has knowledge of Industrial Safety Standards and who shall devote at least one-half (½) of his entire time to safety inspection work. He shall keep records as required herein, and shall:

I. Follow up general lines of outstanding safety work and keep records of same.

II. Make general inspection of plant and machinery and make written recommendations for necessary standard safeguards or safety precautions.

III. Make or arrange for regular inspection of special equipment, such as elevators, cranes, engine and motor stops, etc., and shall keep written records of such inspection.

IV. Inspect for maintenance of safeguards, general order, and arrangement of materials, cleanliness and lighting.

V. Look after fire conditions, extinguishers, filling of fire (water and sand) pails, and keeping exits clear.

VI. Investigate, record and report on all accidents.

VII. See that drawings and specifications for new machinery cover the guarding in accordance with standards of dangerous features, such as gears, sprockets and couplings, inspect new machinery before it is in operation and see that necessary standard safeguards have been provided.

(b) There shall be a Workmen's Committee of not less than three (3) workmen. The personnel of the Committee shall be changed at regular intervals preferably by rotation. The Committee shall:

I. Make not less than one (1) thorough inspection of the plant each month, and shall submit written reports of recommendations for safeguarding or approved safety conditions which they consider desirable, which reports shall be signed by members of the Committee.

II. Inspect for maintenance of safeguards, general order and arrangement of materials, cleanliness and lighting.

III. Look after fire conditions, extinguishers, filling of fire (water and sand) pails, and keeping exits clear.

EDUCATION

(CLASS A, 1-150 EMPLOYEES)

STANDARD

(1) Suitably located bulletin boards shall be provided, on which safety bulletins (which shall be changed at least monthly) and safety orders, rules and information shall be posted.

(CLASS B, 151-500 EMPLOYEES)

(2) (a) Suitably located bulletin boards shall be provided, on which safety bulletins (which shall be changed at least monthly) and safety orders, rules and information shall be posted.

(b) There shall be at least semi-annual meetings of employees at which talks on Safety shall be given.

(CLASS C, MORE THAN 500 EMPLOYEES)

(3) (a) Suitably located bulletin boards shall be provided throughout the plant on which safety bulletins (which shall be changed at least monthly) and safety orders, rules and information shall be posted.

(b) There shall be at least semi-annual meetings of employees at which talks on Safety shall be given.

(c) Safety Literature, such as printed operating rules, warning signs and notice on payroll envelopes, shall be provided or distributed among the employees.

FOREMEN

The proper carrying out of safety work and the prevention of accidents depends, to a great extent, upon the foremen. They should be men capable of maintaining a well-disciplined shop, and should have impressed upon them the importance of preventing accidents, as well as keeping up production in their departments.

The following are a few of the things which should be considered duties of the foreman:

(1) Instruct new men as to proper methods of operating machines.

(2) Point out to them the dangerous parts of the machine and methods for safeguarding same.

(3) Emphasize importance of holding stock firmly when feeding machines.

(4) Impress upon employees the need of close attention to their work when operating machines.

(5) Explain the importance of keeping loose material from accumulating on or about machines.

(6) Emphasize the dangers of wearing clothing with unbuttoned sleeves or with ragged or loose ends which may be caught in the machinery.

(7) See that guards are kept in repair and used.

(8) Give occasional short talks to the workmen on matters pertaining to safety.

(9) Insist on safety rules being obeyed.

SECTION II

LOGGING

LOGGING

Logging is one of the most dangerous branches of a dangerous industry. The two most important features to be considered in the prevention of logging accidents are good equipment and competent supervision. One logger, who in twenty years' experience in charge of large logging operations, has never had a serious accident to any of his men in felling or skidding, says that when a man is injured or killed in the woods, someone should go to jail. While this is perhaps a radical view, it undoubtedly has had much to do with keeping his record clean.

The following rules have been adapted from a bulletin of the Wisconsin Industrial Commission; they have been endorsed by practical loggers in various parts of the country; they are given here with a recommendation that they be either posted where workmen can read them or furnished to the workmen in pamphlet form.

CHOPPERS AND SAWYERS

CARRYING AXE. The only safe way to carry an axe is with the handle on the shoulder and the head back of the shoulder. Many men who have carried the axe with the head under the arm have stumbled and fallen and have been seriously injured.

Note: A number of choppers have made out of wood and leather a little shield or case which covers the head and protects the blade and also protects the arm of the chopper when carrying it.

CARRYING SAW. The only safe way to carry a saw is to carry it over your shoulder with the teeth pointed away from the neck.

SPACE TO SWING THE AXE AND GET AWAY.—Before starting to fell a tree always clear out a space which will give you room to swing your axe safely, and also be sure to clear a path so you can get away when the tree falls.

WHEN THE TREE STARTS TO FALL. Always get out of danger AT ONCE when the tree starts to fall, and LOOK UP and watch for falling limbs. Hundreds of men have been injured and killed by falling limbs.

TREES KICK BACK. When a tree falls it is likely to kick back from the stump. When the tree starts to fall, always get back far enough so you cannot be struck by the butt of the tree.

CHOPPING SPRING POLES. You should be careful in chopping spring poles. There is always danger of their flying back and striking you.

SKIDDING

KICKING HORSES. Be careful around horses that are likely to kick. Many men have been seriously injured by kicks. Always speak to a horse before going near him.

HITCHING ON TO LOG. When you hitch on to a log be careful to get out of the way and stand on safe side before the log starts.

SWAMPERS GET OUT OF WAY. Swampers should keep an eye out for the team of the skidder, and before the log starts they should step out of the way.

LOOK OUT FOR STUMPS. Skidders should look ahead and steer clear of stumps or other obstacles which the log or logs may strike, and thus cause them to be thrown against the skidder.

HIGH LEAD. Overhead skidding with high lead is probably the safest method of logging where it is practicable, as in case of a broken cable, unless someone is directly under the lead, there is little possibility of an injury.

EXTRA TACKLE. For high lead skidding, extra tackle should be provided so that the spar can be rigged ahead of the skidder, giving the loggers plenty of time to complete their work thoroughly without hurrying before moving the skidder.

INSPECTIONS. Thorough inspection of all of the skidding tackle and equipment prevents delays as well as accidents. A breaking cable or sheave block reflects credit on no one.

LOADING

ENGINEER RESPONSIBLE FOR EQUIPMENT. The engineer should carefully inspect all machinery, cables and other equipment at least once each day, and make sure that everything is in good repair and in safe condition.

HOOKERS STAND AWAY. When the logs are lifted the hookers should stand away and give safe clearance for the logs.

TOP LOADER HAS IMPORTANT POSITION. The top loader occupies a very responsible position. If he is careless or reckless the lives of the loading and the unloading crews, the trainmen and the public are endangered. He should be careful to see that all chains and stakes are fixed securely and all logs not held by chains or stakes are safely placed. Many people have been injured because the loader was careless. The loader occupies a dangerous position and should also be careful to protect himself.

ENGINEER STEADY LOGS. In lifting the logs the engineer should steady the logs at the point where they break on to the load, and then he should look to see the position of the top loader before placing the logs.

TWISTED CHAINS DANGEROUS. Loaders should watch the chains to see that they do not get twisted. A twisted chain is easily broken and is always dangerous.

OVERLOADING CARS. Loaders should not overload the cars. An overloaded car is always dangerous.

DECKING

GOOD FOUNDATIONS. The most important thing in decking is to have good and safe foundations.

SAFE DECKING. Be sure that the log on the face of your deck is so placed and blocked as not to crowd out and allow the skidway to break down. All face logs should be placed in such a position that they cannot crowd out.

HIGH ROLLWAYS DANGEROUS. Take special care when standing on high rollways. They are always dangerous.

SLEIGH HAULING

TOP LOADER RESPONSIBLE. The top loader is responsible for all equipment, and should make frequent inspections to see that everything is in safe condition. In loading, the top loader should always remember that if he is careless he may cause a serious accident to his fellow workmen.

DANGER ON HILLS. When approaching a hill teamsters should make sure that the hill is in safe condition before attempting to go down. Many serious accidents have happened on account of hills not being in proper shape, which caused the load to get away, injuring and killing men and teams.

RAILROADS

JUMPING OFF CARS. Don't jump on or off the trains while they are in motion and when riding on cars to and from the camp, be careful; otherwise you are likely to be seriously injured or killed.

STANDING TOO NEAR MOVING TRAIN. When a train of logs is passing always stand back from the track at least twenty feet. You may be struck by a loose log.

HOW TO HANDLE DYNAMITE AND CAPS WITH SAFETY

THE HANDLING OF EXPLOSIVES IS DANGEROUS BUSINESS. Every man Should Observe the Following Rules:

SMOKING FORBIDDEN. Smoking while handling explosives is strictly forbidden.

DON'T LET EXPLOSIVES FALL. Don't throw or allow boxes of explosives to fall violently.

USE WOODEN TAMPING STICKS. Don't do tamping with iron or steel bars or tools. Use only the wooden tamping sticks provided for this work.

CARE OF EXPLOSIVES. Don't allow explosives to lie around loose in places where you are working.

CAPS KEPT SEPARATE FROM DYNAMITE. Don't leave blasting caps in the same box with, or close to, dynamite.

DON'T CARRY CAPS IN POCKET. Don't carry blasting caps in your pocket, and don't tap or otherwise investigate same.

REMOVING BLASTING CAPS FROM BOX. Don't attempt to remove blasting caps from boxes by inserting nails or any sharp instrument.

BITING CAPS IS DANGEROUS. Don't tighten a cap around a fuse by biting it with your teeth, nor by using a pocket knife. Use a cap crimper which is provided for this purpose.

FROZEN DYNAMITE DANGEROUS. Don't use frozen or chilled dynamite. Don't cut or break a piece of dynamite while it is frozen.

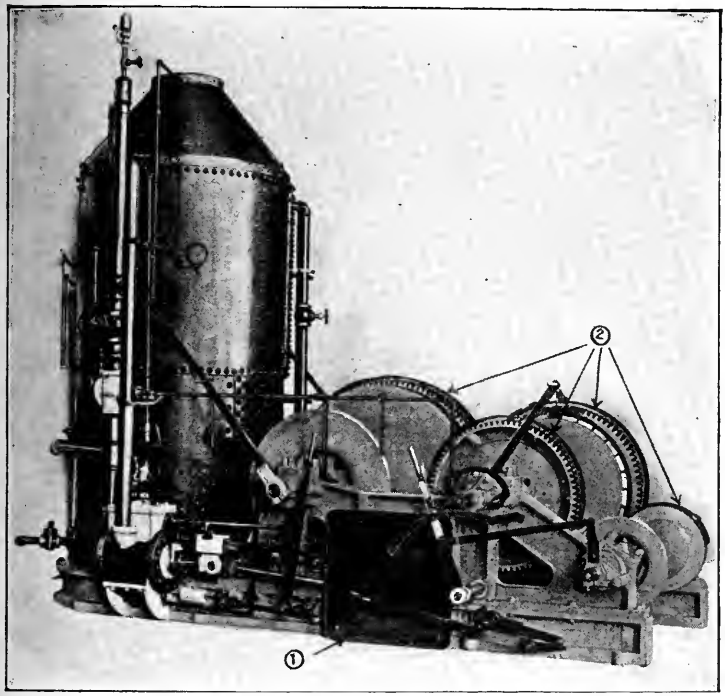
WHEN DYNAMITE FAILS TO EXPLODE. If a charge of dynamite fails to explode, don't go near it for one hour. It may go off and kill you. Do not try to put a new charge in the old hole; drill a new hole 6 to 12 inches from the old one.

THAWING DYNAMITE. Many men have been killed while thawing dynamite. The following methods of thawing dynamite are recommended:

(A) One of the safest and cheapest ways to thaw dynamite is to bury it in a pile of manure.

(B) The regular dynamite hot water thawer, if properly used, is safe. *Don't, under any condition, attempt to thaw dynamite around an open fire.*

REPORTING INJURIES. In case of accident, no matter how trivial, even a slight cut or break of the skin, report at once and have it taken care of.



SKIDDING, LOADING AND HOISTING ENGINES

1. Steel plate guard for crank.
2. Gears guarded sub-standard. Guard should extend to root of teeth.
3. Platform around skidder engine should be as wide as possible and should have a railing. Skidder men may object to this for a short time because of injury to their pride, but will appreciate it as soon as they are accustomed to it.

LOGGING RAILROAD

EXPERIENCED MEN NECESSARY. Where the nature of the equipment requires men to travel the train while in motion, special attention should be given to the selection of men. This work requires a cool head, a sure foot and experience.

AIR BRAKES. Where practicable, air brakes should be used, as they make it unnecessary to travel over the train during the trip and greatly reduce the danger.

LOGGING RAILROAD

Above photograph shows the wreck of a logging train due to defective ties. Many logging companies have found that, from the standpoint of economy as well as accident prevention, it pays to construct substantial road beds.

LOADING

Wherever possible, the passing of logs over men's heads should be avoided.

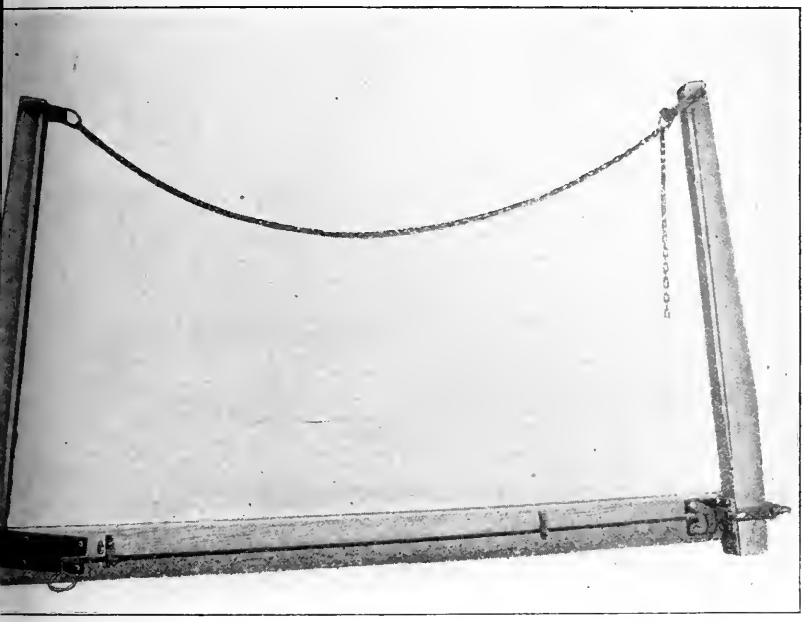
In the above photograph, the danger to the loader, should the cable break or the tongs pull out, is easily recognized. Where such methods are necessary, especial attention should be given to keeping cables and all hoisting equipment in safe condition, the tongs should be kept sharp and the hooker-on should be a careful and experienced man.

The safety of the train crew or haulers depends on the skill and care with which logs are loaded. In general, the top loader needs considerable skill to protect himself. Loaders should be physically and mentally fitted for their job and only experienced men permitted to do the more dangerous work.

SECURING LOGS ON CARS

Logs should be well secured to cars or bunks.

CHAINS AND STAKES. Very large logs should be secured by chains. Where several logs are piled on a car, a type of car stake which can be released from the opposite side of the car is preferable. If chains are used, these also should be released from the side of the car opposite to that from which the logs are unloaded.

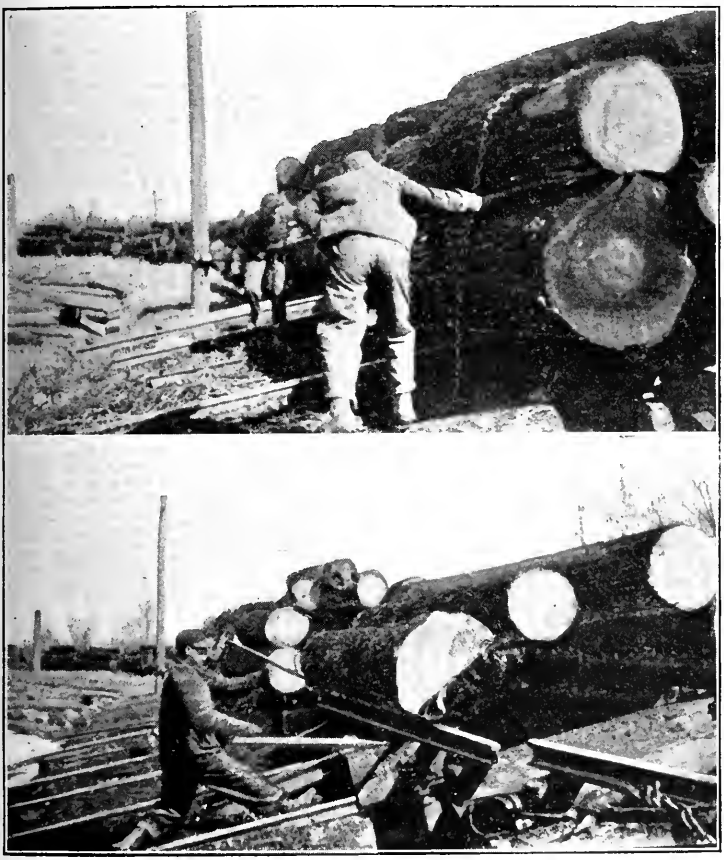


CAR STAKE

The above illustration shows one of a variety of car stakes. These are much safer than chains where practicable.

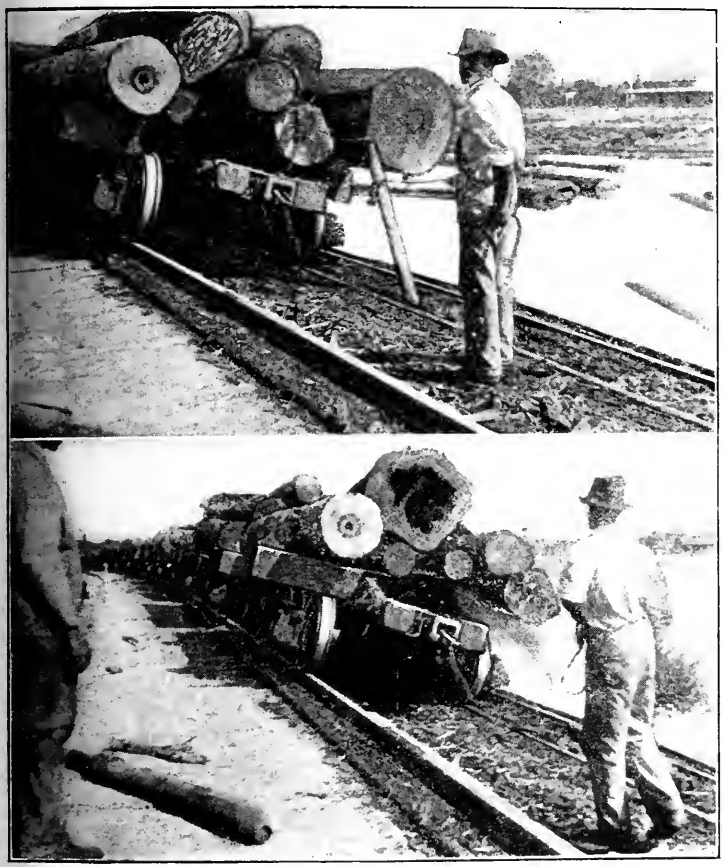
UNLOADING CARS

The following six illustrations show two methods of unloading cars into a pond from a track on which the rail farthest from the pond is elevated above the other rail so as to slope the floor of the car toward the pond. The logs in both of these operations vary from eight inches to four feet or more in diameter and the cars in both operations are of the same type and size. The method shown in illustrations 1 and 2 requires a rollway between the track and pond. With the other method, logs are dumped directly from cars into pond. The second method has the advantage of being very much quicker as well as safer than the first. Unloaders need never be in a position where a log rolling from the car may strike them as is necessary with the first method. The first method is very fatiguing, the second not at all so.



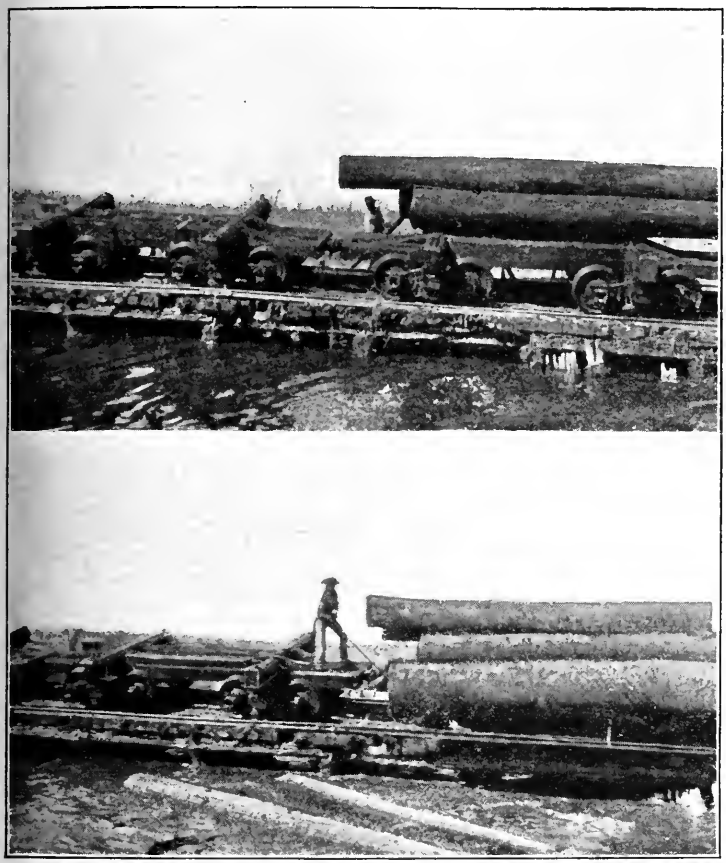
DANGEROUS METHOD OF UNLOADING

After chains are released, men start logs with cant hooks. Note in the upper illustration man in foreground is completely off ground resting on his stomach on handle of cant hook, while in second illustration, the position is equally dangerous should logs start suddenly.



SAFE METHOD OF UNLOADING

Stake is held in manner shown in illustration above, lower end being placed against tie. Train is moved slowly toward man in picture, stake lifting log over chock. Usually the entire load rolls off car without further effort.



Above illustrations show method of unloading cars from the far side of track and from adjacent car platform. Cars move very slowly, introducing no hazard from moving cars.

SECTION III

SAW MILL

SAW MILL

Saw mills present many hazardous conditions not found in other plants, but the workmen become so accustomed to these conditions that they often forget the dangers, and take chances which frequently lead to serious, or even fatal, accidents. Observance of the following rules will tend to minimize accident frequency:

Machines should have their belts and other moving parts guarded.

The gears driving live rolls should be enclosed.

Sufficient working space should be provided around machines.

Runways should be provided where it is necessary for workmen to pass over dangerous moving equipment.

Floor openings should be protected by rails and toeboards.

Waste material should not be allowed to accumulate in the mill.

Care should be taken in the guarding of belts, pulleys, etc., on the transmission floor.

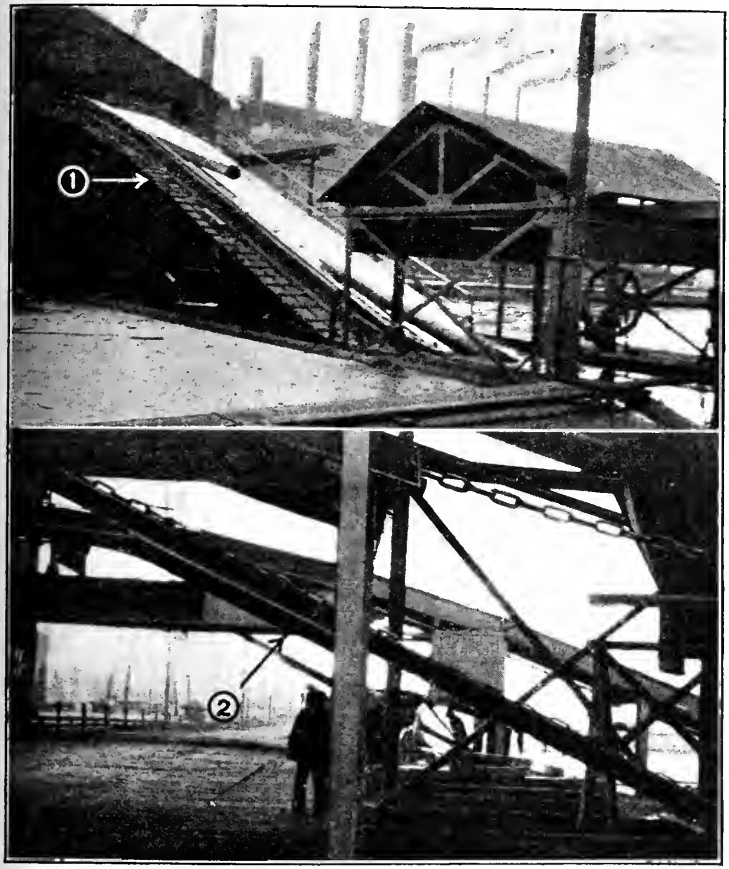
The foreman should exercise close supervision over all work in the mill, and see that the rules are rigidly enforced, and that proper safety precautions are taken.

LOG SLIP

Walkways with railing and toeboard should be provided on both sides of the log slip from the pond to the deck. The railing should be sufficiently strong to hold a log on the walk should the log be thrown out of the slip.

Planks should be separated one inch for drainage.

Cleats should be provided to give secure foothold.



LOG SLIP

1. Walkway should be provided with toeboard.
2. Guard under idle part of log chain.

DECK

At the top of the log slip there should be a buffer of heavy timbers sufficiently strong to stop the log chain in case the deckman allows a log to hit it.

Floors of decks should be kept in good repair, as men handling logs on the deck frequently have to jump from in front of rolling logs, and unless their footing is good a serious accident may result.

Cant hooks should be kept sharp and handles free from cracks.

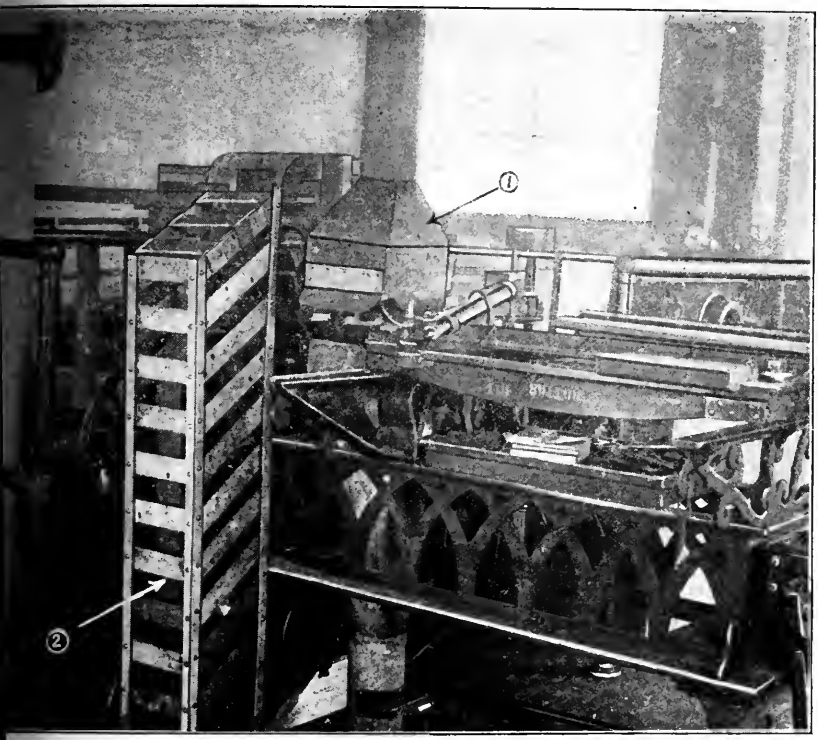
A log should always be left on the deck against the snubs to prevent a log from rolling down the deck rapidly and jumping over the snubs.

TENONERS

The point of operation on this type of machine can usually be guarded by a close-fitting shaving exhaust hood.

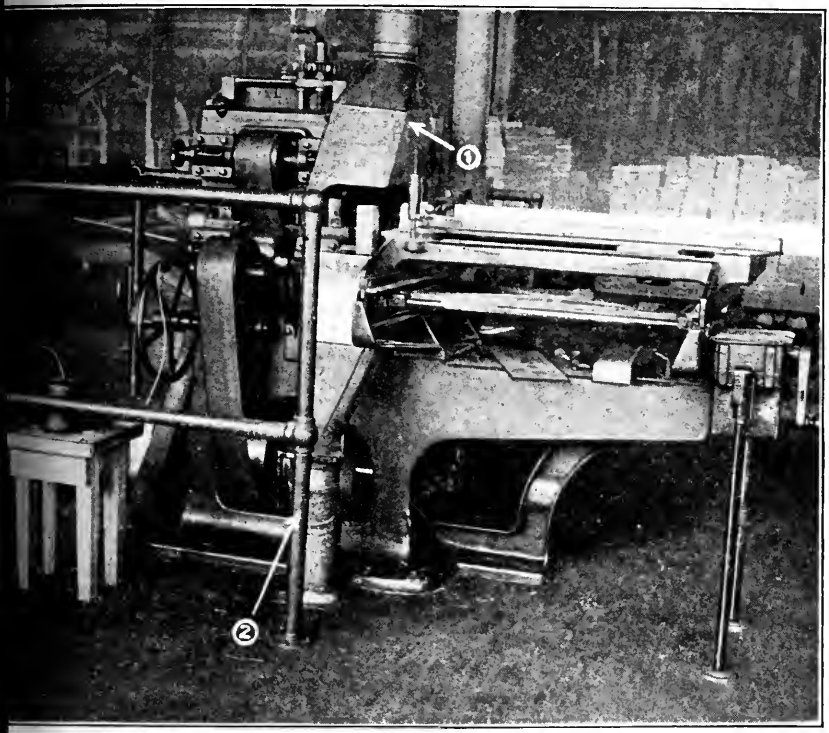
The belts and moving parts are operated at high speed and should be completely guarded by a substantial enclosure.

Exhaust hoods covering rapidly revolving cutters should be constructed of material sufficiently heavy to hold a cutter blade in case it should become loosened from head. This applies to such machines as tenoners, moulders, etc.



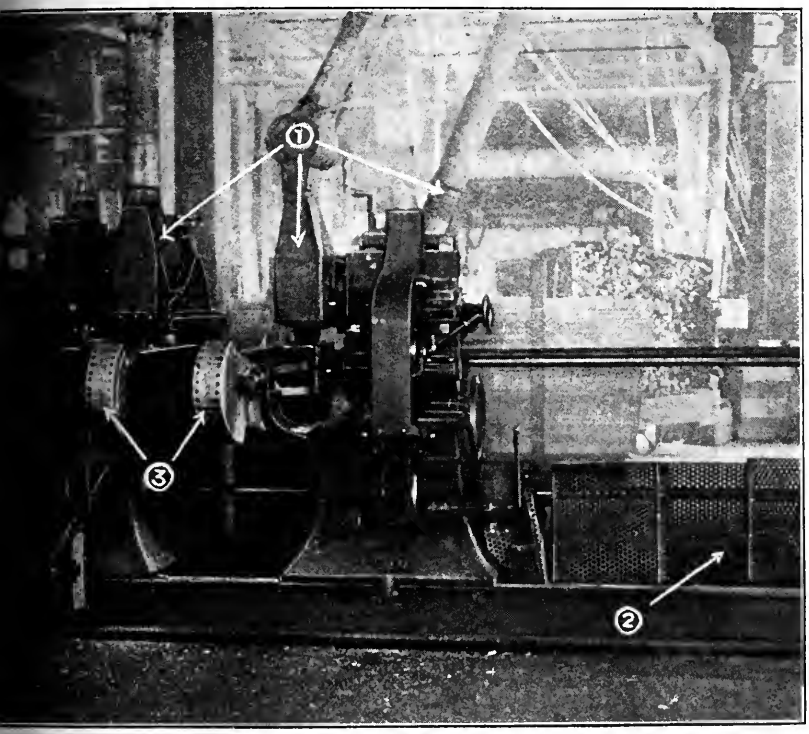
TENONER

1. Shaving exhaust hood affords some protection at point of operation.
2. Belts, pulleys and other moving parts guarded sub-standard by substantial rail and enclosure. See Industrial Standards—Section I—Page 7.



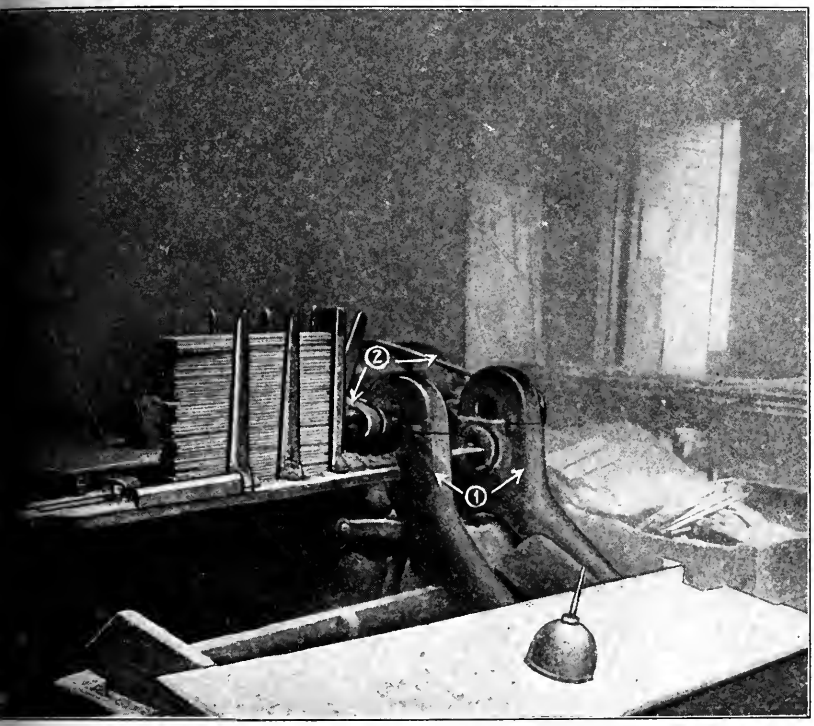
TENONER

1. Shaving exhaust hood affords some protection at point of operation.
2. Belts and pulleys, guarded sub-standard. Rail too close. See Industrial Standards—Section I—Page 7.



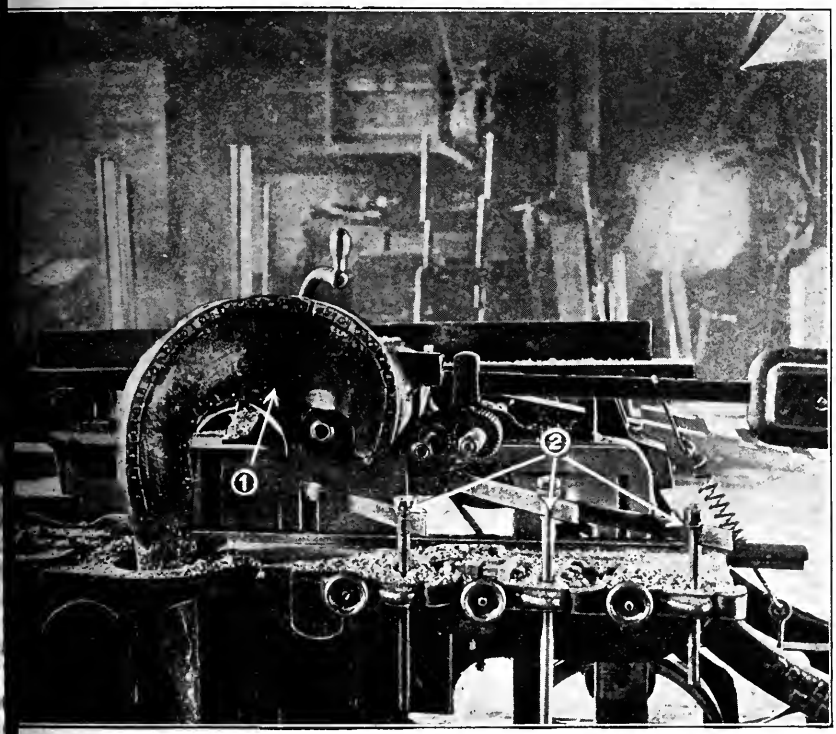
DOUBLE END TENONER

1. Shaving exhaust hood at point of operation.
2. Driving shaft guard is made sectional to permit adjustment and change in position of cutting head.
3. Feed chains guarded to standard.



SLAT TENONER

1. Point of operation guarded by shaving exhaust hood. The character of work done on this machine permits an automatic feed. This machine is so equipped, but the arrangement is not shown in the illustration.
2. Machine belts are exposed and should be completely guarded by standard enclosure. See Industrial Standards—Section I—Page 7.



SLAT STICKER

1. Exhaust hood forms an effective guard over cutter head.
2. Spring clamps to hold stock in position.

SECTION V

SAWS

CIRCULAR SAW

This is one of the most widely used of all tools, and, at the same time, one of the most dangerous. While the moving parts on circular saw equipment are fewer in number than on many other machines, they are nevertheless dangerous. Belts, pulleys, shafting, gears, chains, sprockets, etc., should be fully guarded so that persons may not be injured by them.

Probably more attention has been given to guarding the point of operation on circular saws than on any other machine. Different classes of work require different types of guard.

The portion of the saw above table should be covered so that the person feeding the stock cannot come in contact with the saw.

It is also important in many cases that the operator see clearly the cutting portion of the saw. This necessitates a guard of open construction.

There is also the danger of kick-back of stock which may cause very serious, or even fatal, accidents. The guard illustrated on pages 11, 12 and 13 is designed to take care of this hazard.

On rip saws a splitter or riving knife should be provided to prevent binding as the stock leaves the saw.

Self-feed saws should have the feeding device protected to prevent operator being caught in same.

Protection should be provided for portion of saw extending below table.

Care should be observed in mounting saws to see that they run true and are located in proper position.

Where saws with inserted teeth are used, great care should be taken to see that they are properly set and securely locked in position.

When circular saws are not in use, they should be hung where the teeth are protected against accidental contact. Serious injuries have been caused by running into saws hung on posts where the teeth projected beyond the post.

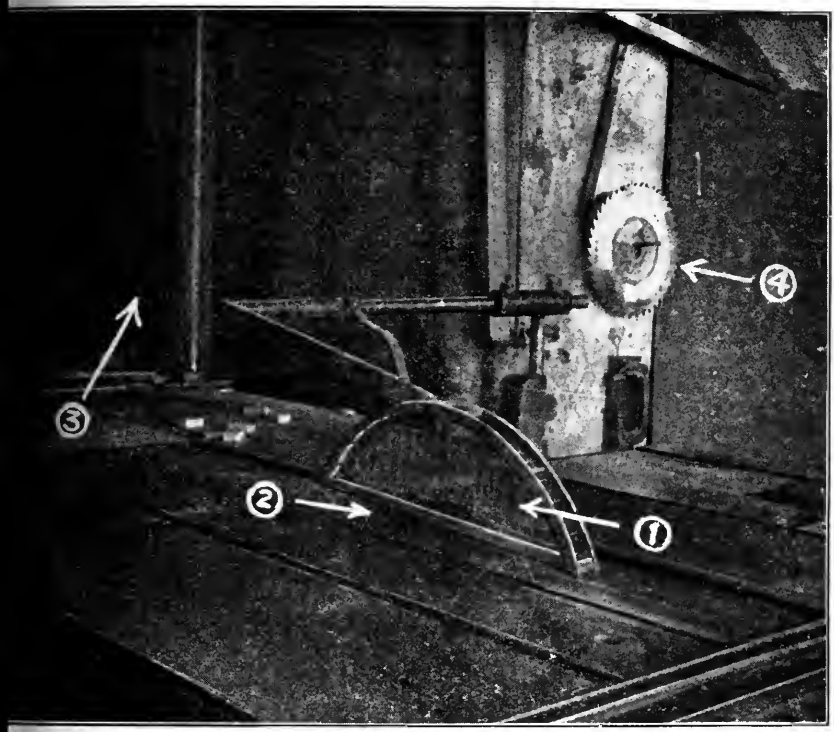
It is especially important that the foreman instruct new men carefully in the proper operation of circular saws, emphasizing particularly:

The necessity of close attention to their work when operating such machines.

The deceiving appearance of circular saw teeth when running. The teeth are almost invisible when saw is revolving at high speed.

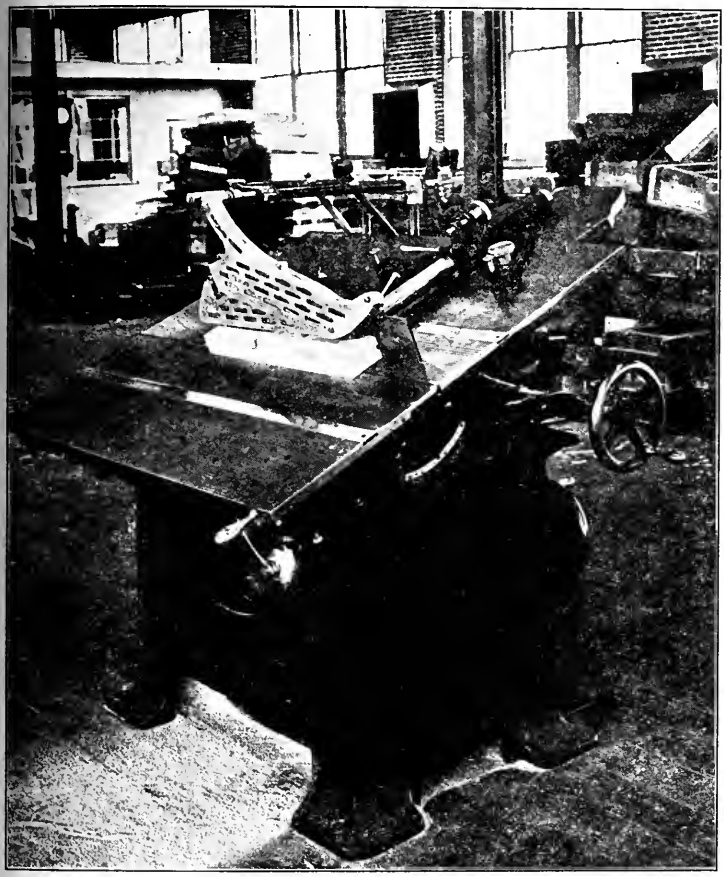
The danger of allowing pieces of stock to remain on table where they may be brought in contact with saw and thrown.

The importance of keeping space about machine free from loose material which might cause tripping.



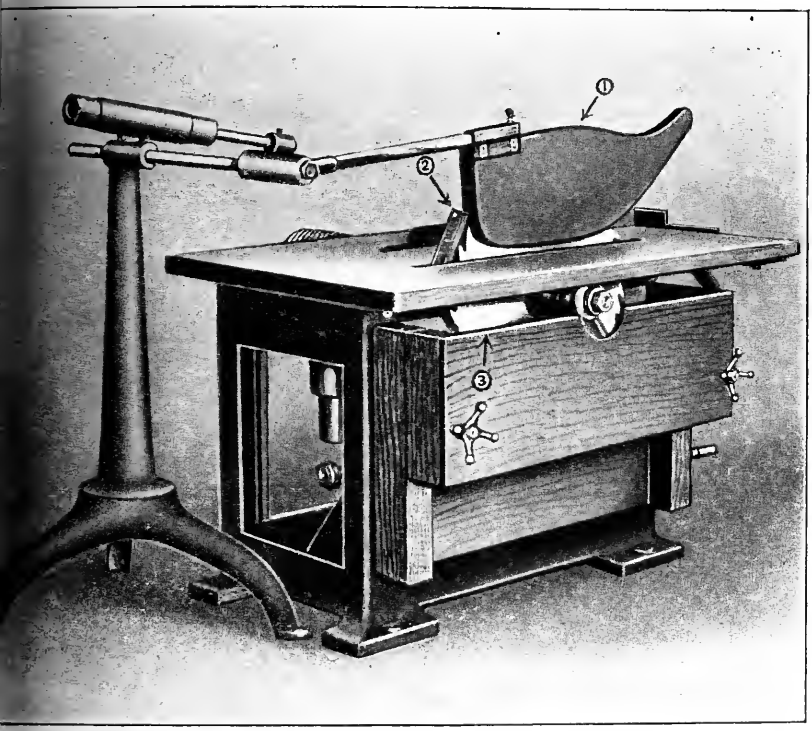
CIRCULAR SAW

1. Hood guard for saw. Guard frame mounted on table. This guard must be set to a height greater than the thickness of the stock. Not adaptable to variety work.
2. Spreader behind saw.
3. Belts fully guarded.
4. Edge of extra saw extends beyond post, thus presenting a hazard to passersby.



CIRCULAR SAW

A guard of this type adaptable to various classes of work.

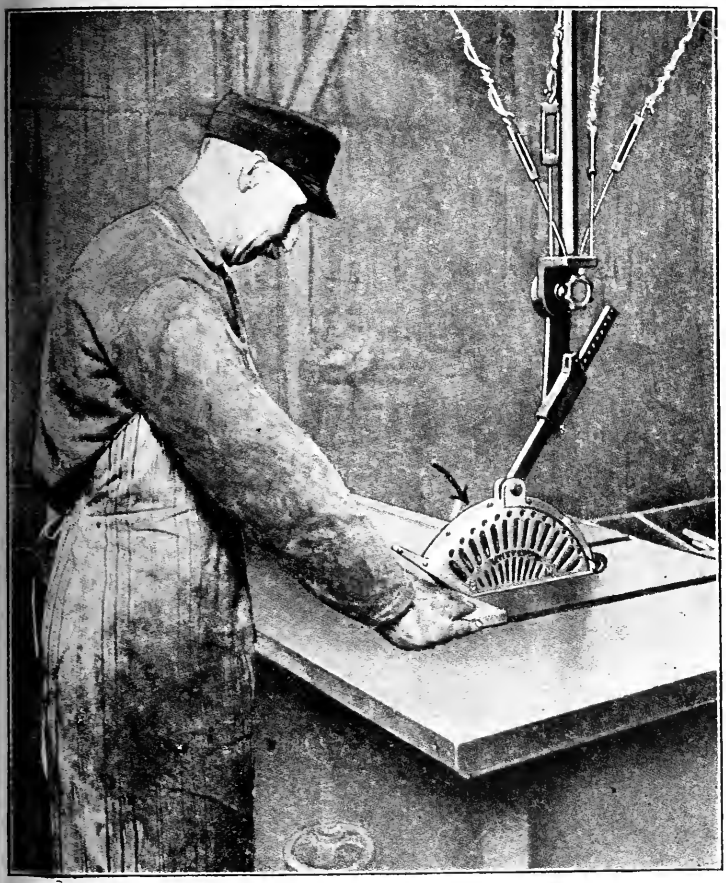


CIRCULAR SAW

1. **Saw guard with floor support.**
2. **Splitter.**
3. **Exposed section of saw under table should be enclosed.**

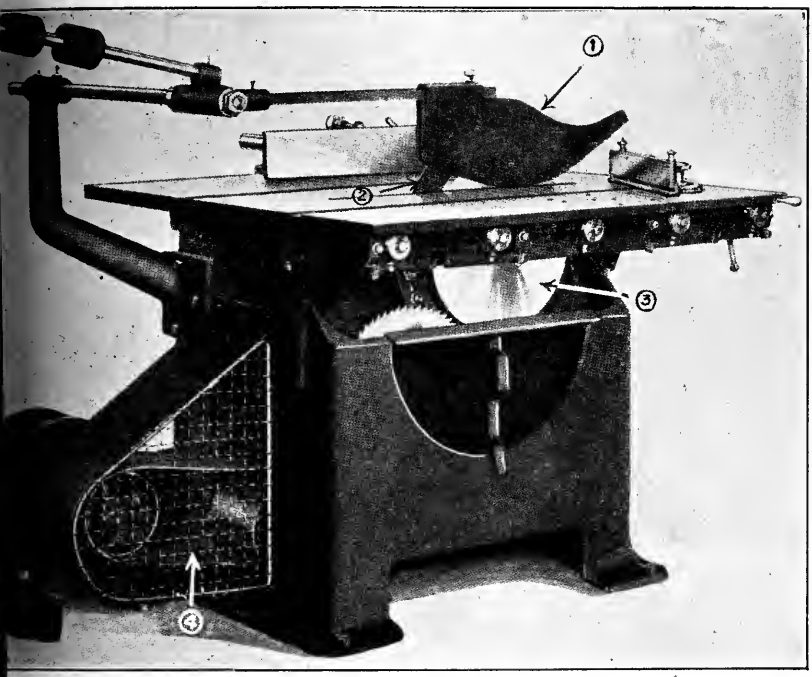
CIRCULAR SAW

1. Saw guard suspended from ceiling.
2. Exhaust.
3. Belts guarded.
4. Moving parts and saw below tilting table guarded.
5. Light not properly shaded.



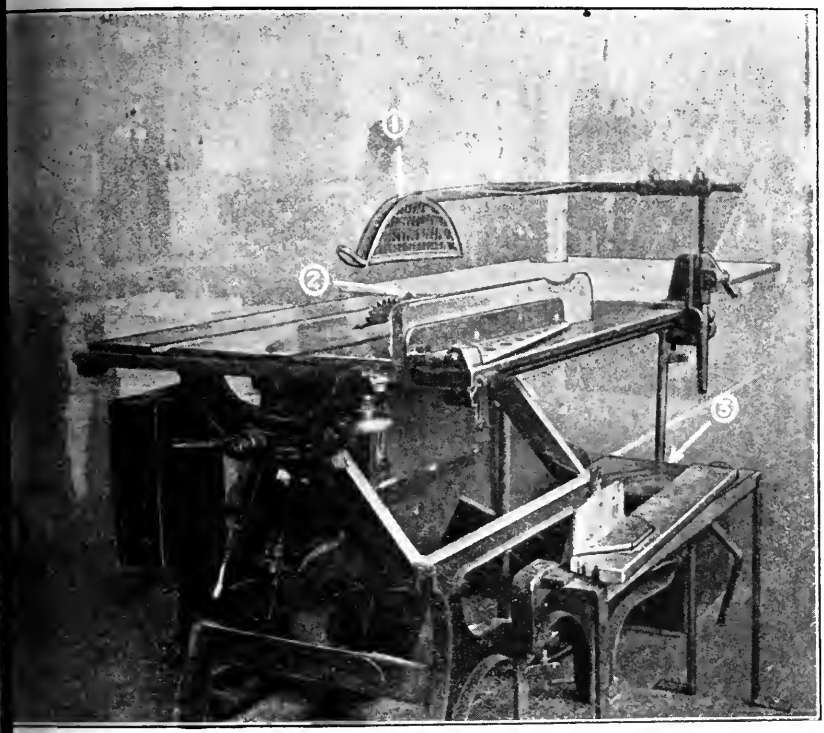
CIRCULAR SAW GUARD

Substantial guard supported from overhead.



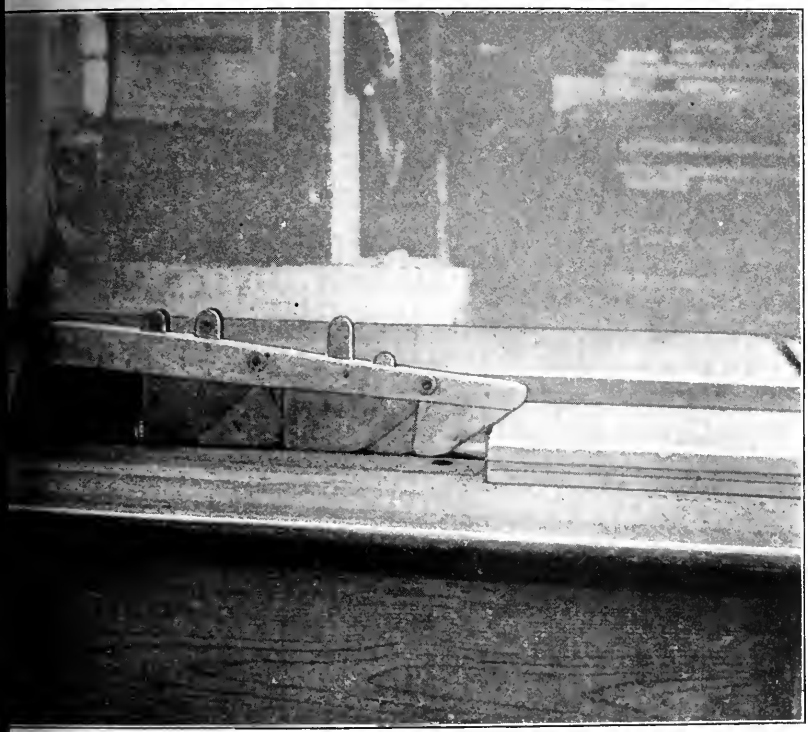
UNIVERSAL SAW BENCH

1. Self-adjusting saw guard.
2. Spreader.
3. Saw under table only partially guarded.
4. Belt and pulley guarded by manufacturer of machine. See Industrial Standards—Section I—page 7 for correct size of mesh.
5. Individual drive.



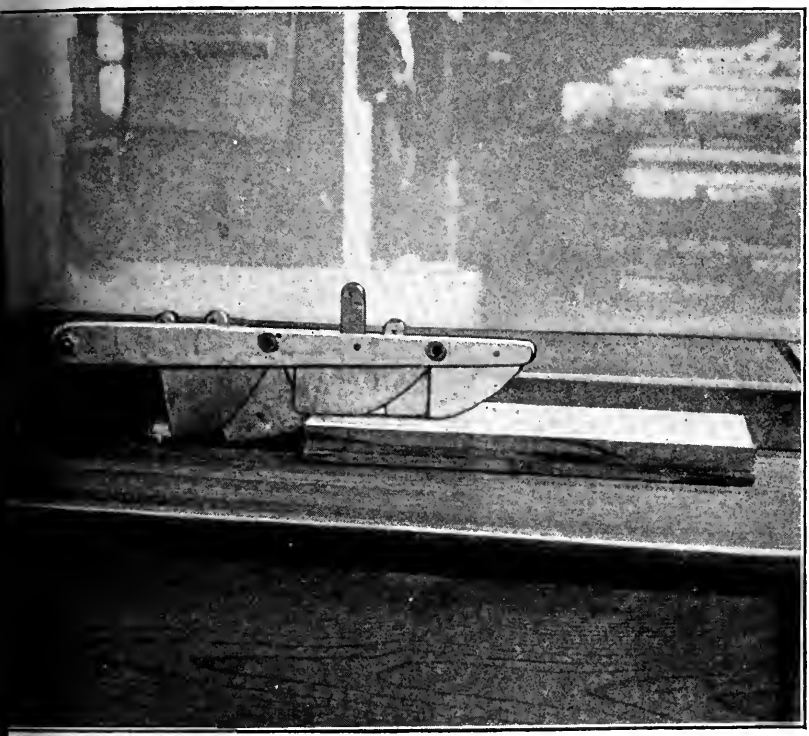
CIRCULAR SAW

1. Adjustable saw guard.
2. Spreader.
3. Individual drive. Belt guarded.



RIP SAW GUARD

Illustration shows sectional guard with stock in starting position. Rear of guard acts as spreader.

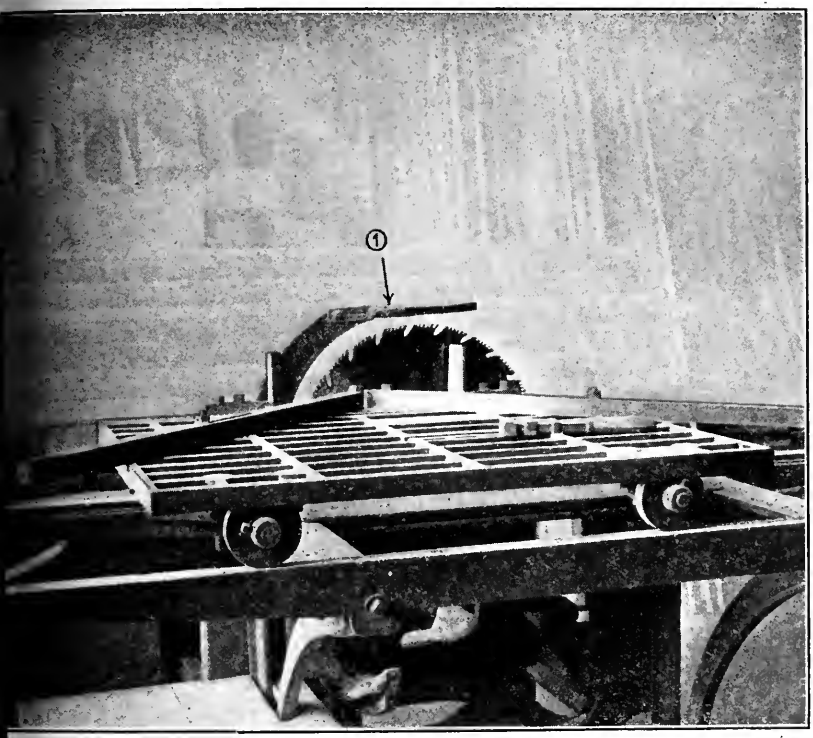


RIP SAW GUARD

Note that guard is automatically adjustable for different thicknesses of stock.

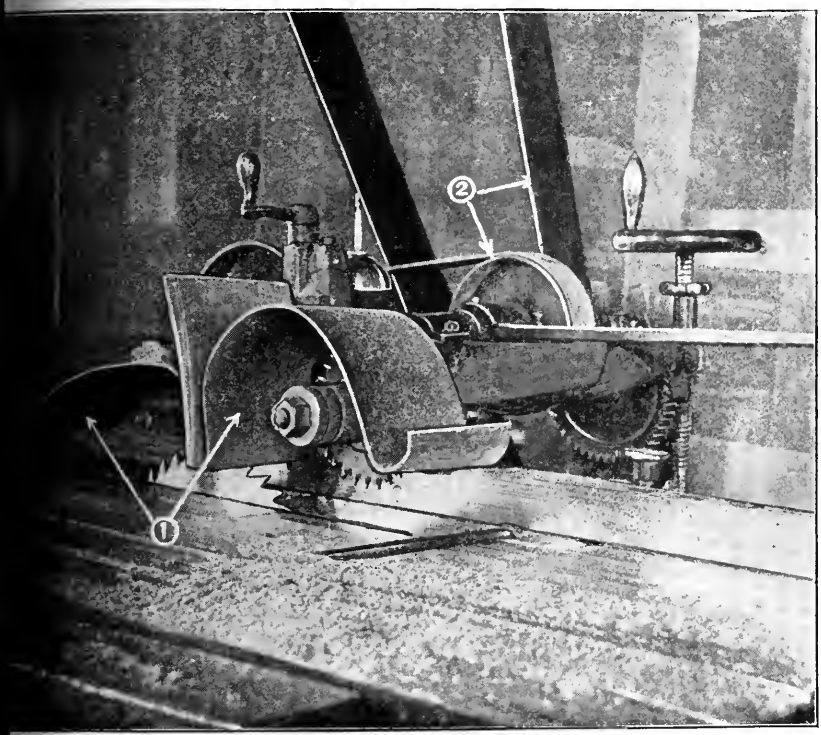
RIP SAW GUARD

Note that arrangement of sections is designed to prevent kick-back.



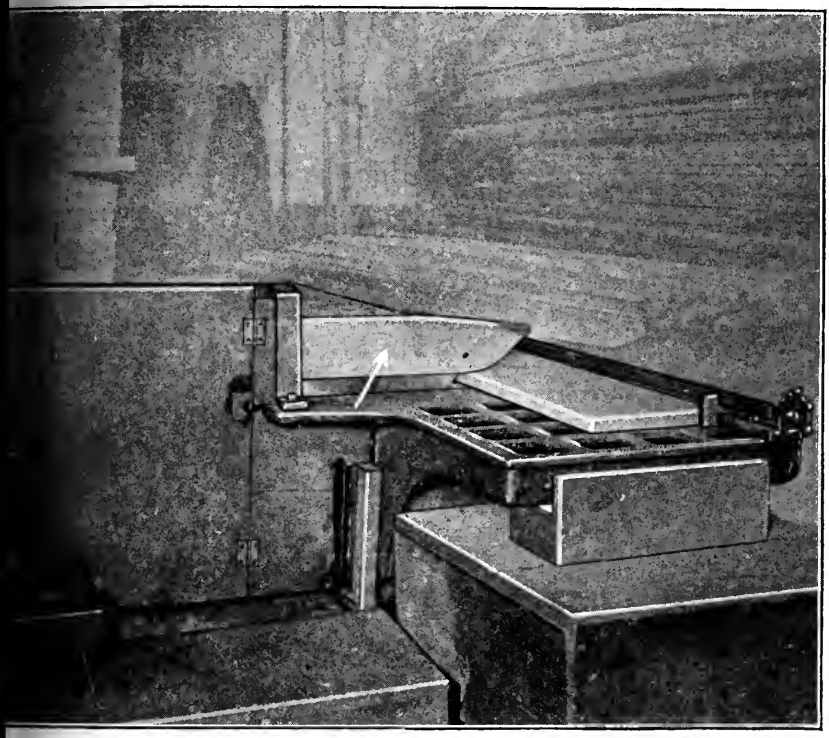
MITRE SAW GUARD

Note that spreader and guard are too far from saw.



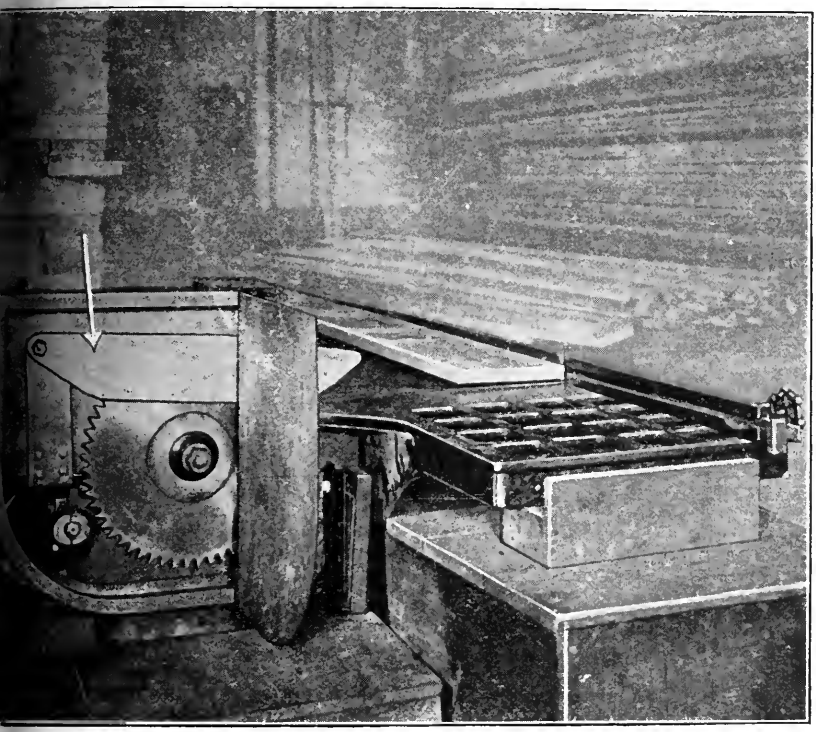
SELF-FEED SAW

1. Efficient home-made guard for saw and feed. Extension at back to prevent boards flying up.
2. Belts and pulleys should be enclosed. See Industrial Standards—Section I—Page 7.



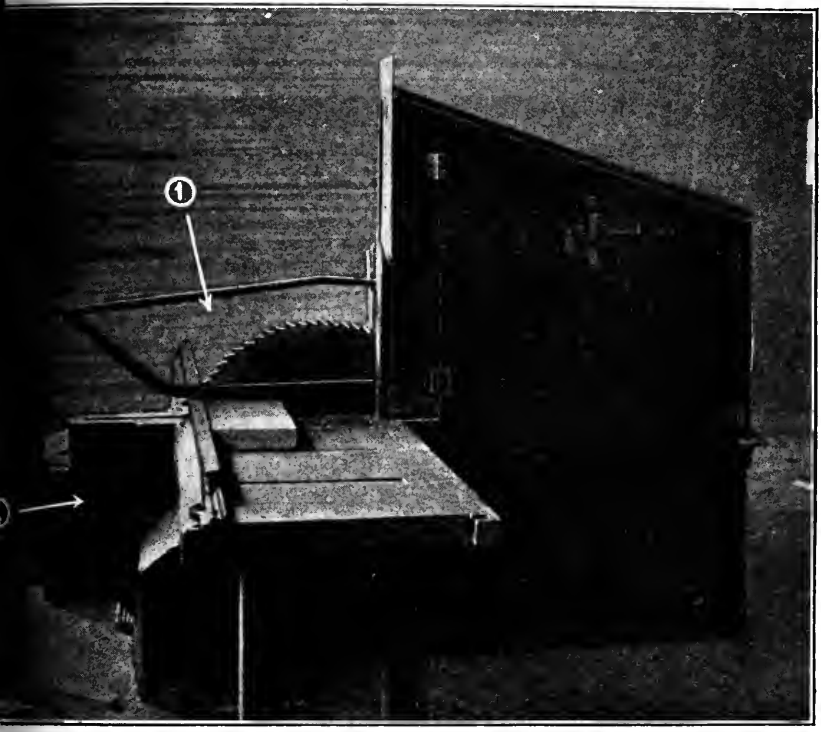
CUT-OFF SAW GUARD

Note that hood travels with saw, so that saw is always covered. Enclosure hinged for convenience in changing saws.



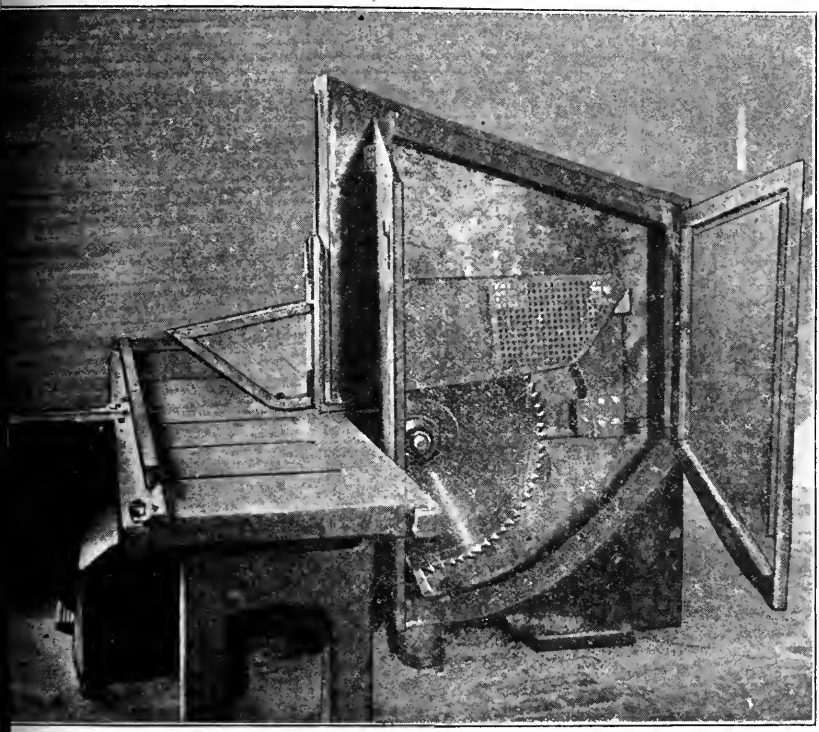
CUT-OFF SAW GUARD

Door open, showing hood in starting position.



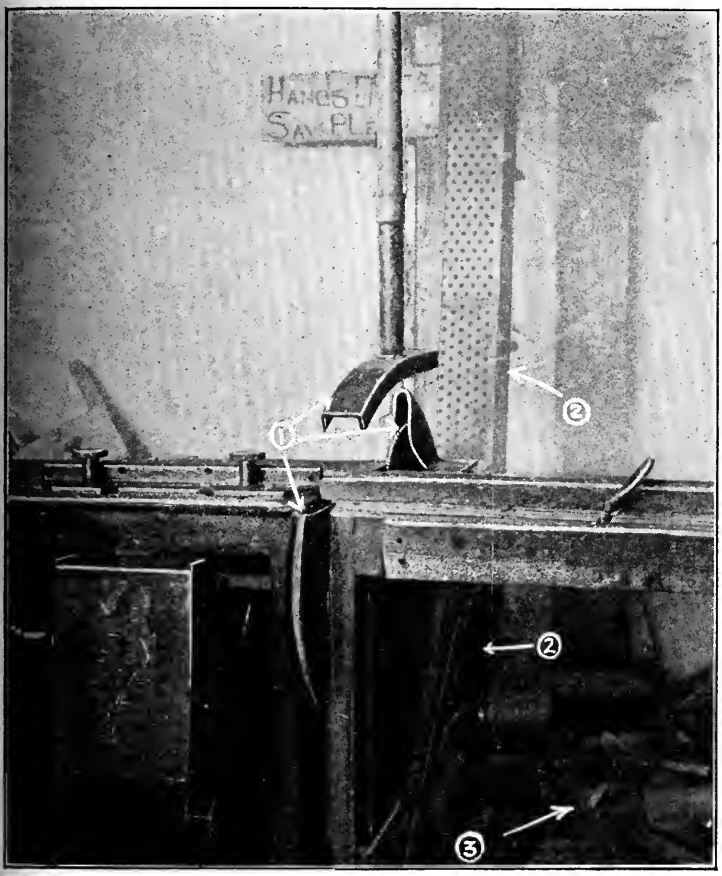
CUT-OFF SAW GUARD

1. Hood of wire screen. Same type as preceding, but for larger saw.
2. Note guard at front edge of table.



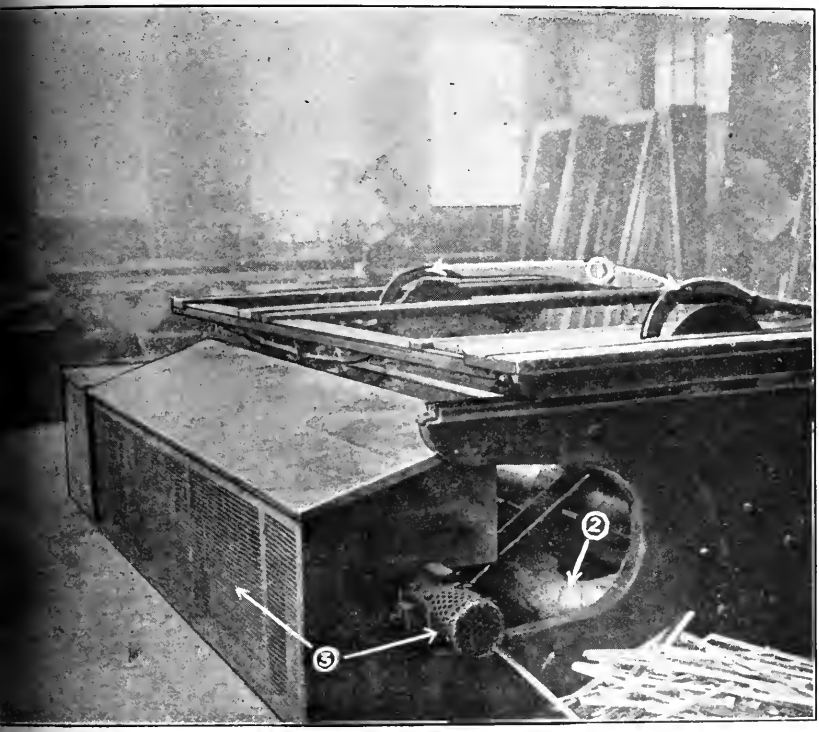
CUT-OFF SAW GUARD

Note accessibility of saw when doors are open.



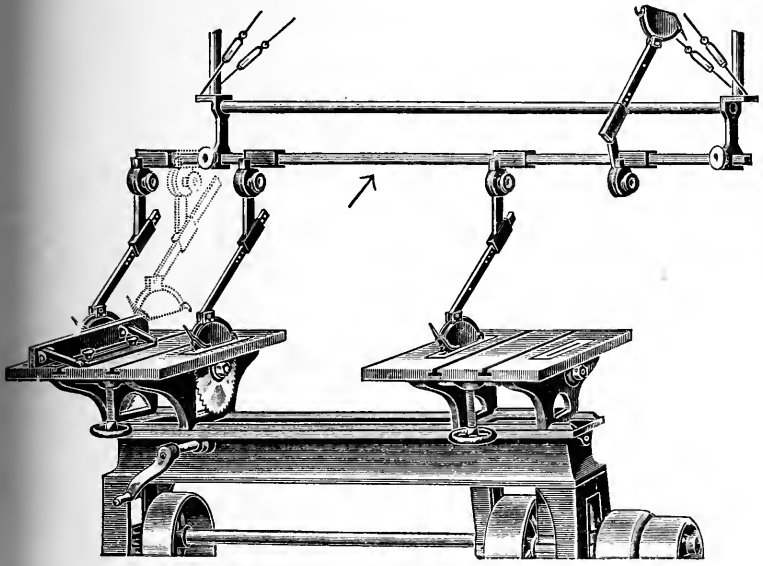
CUT-OFF SAW

1. Guards for saw.
2. Belt above table guarded. Belt below table should be guarded.
3. Bad housekeeping. Blocks should not be allowed to collect.



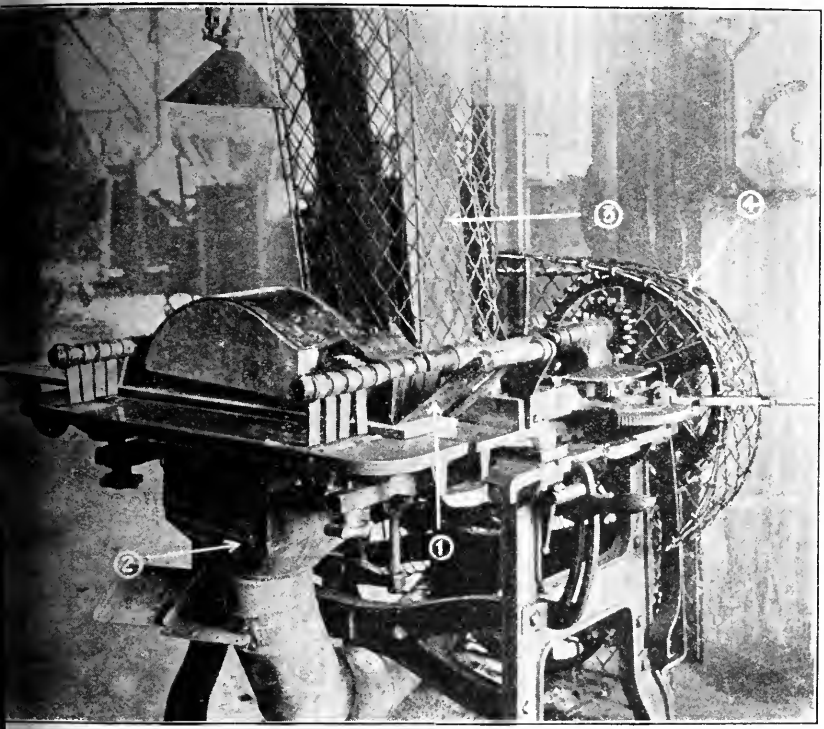
DOUBLE CUT-OFF SAW

1. **Saw guarded.** Spreader too far from back of saw.
2. **Exhaust.**
3. **Belts and shaft end guarded.**



DOUBLE CUT-OFF SAW GUARD

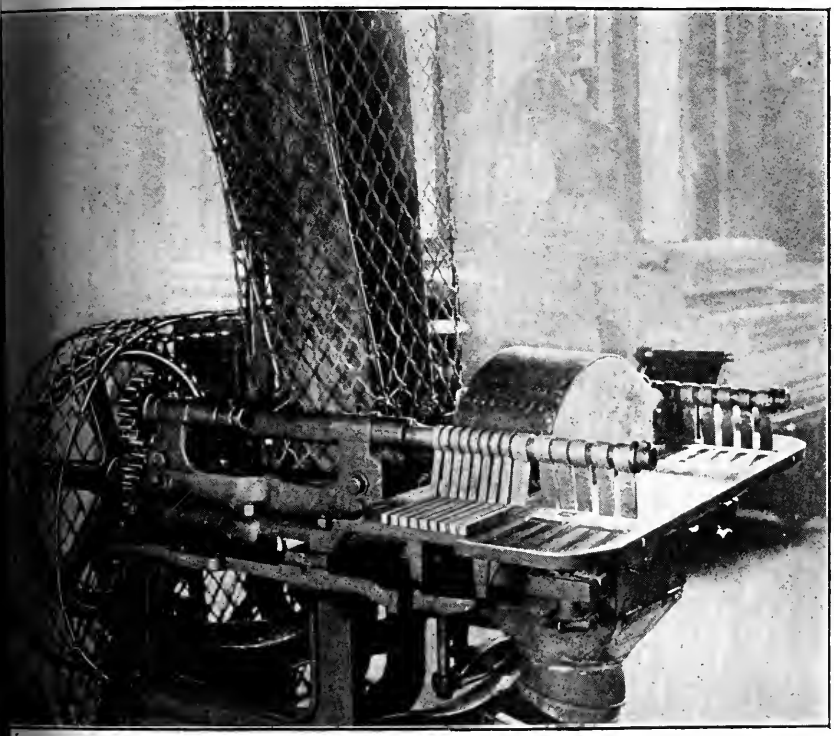
Horizontal rod permits adjustment of guards for various settings of saw.



GANG RIP SAW

1. Point of operation guarded. Note arrangement of fingers to prevent kick-back.
2. Exhaust.
3. Drive belt guarded.
4. Guard for moving parts sub standard. Should extend down on inside to cover sprocket, chain and gear.

See Industrial Standards—Section I—Page 7, for correct size of mesh.



GANG RIP SAW

Rear view of preceding machine. Gears and sprocket should be **fully enclosed.**

SWING SAW

Swing saws should have belt and pulley guarded, and the saw should be provided with a hood that covers at least one-half of the saw disc.

The counterweight and its support should receive frequent attention whether the support is a rope, cable or swing bar.

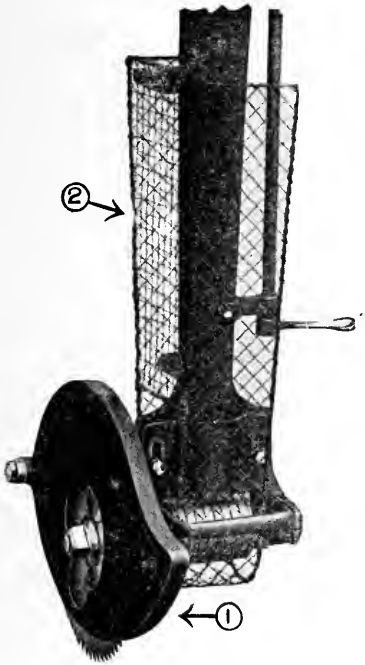
The rope or cable should be watched for signs of wear.

Where the counterweight is supported on a swing bar it should not be allowed to work loose.

It is recommended that the swing bar be so arranged as to work from a horizontal position upward, thus lessening the danger of counterweight slipping off bar.

Another valuable safety precaution is to provide the counterweight with a safety chain attached to swing bar.

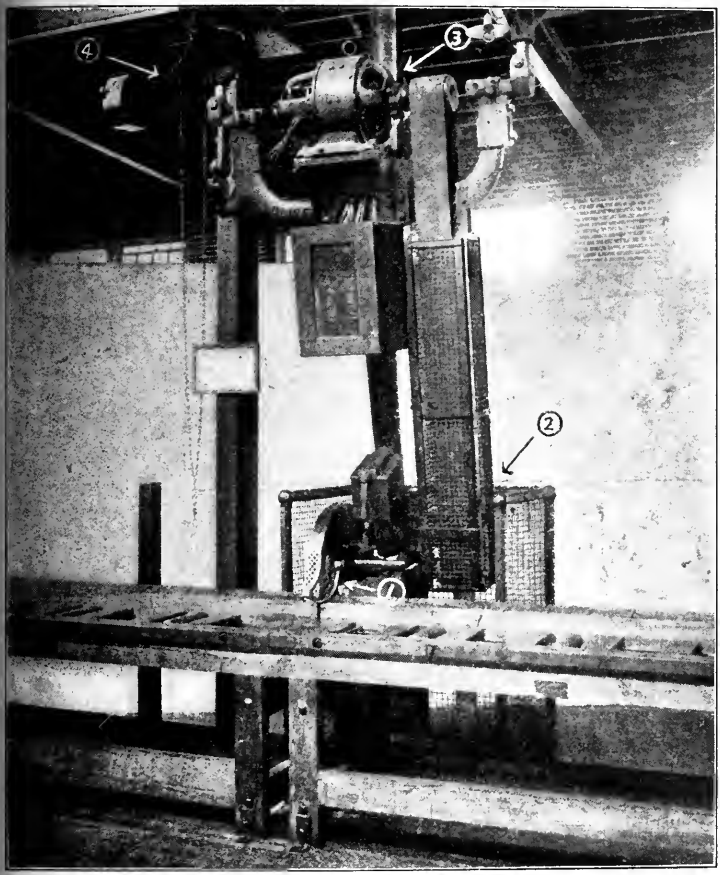
A swing saw should also be provided with a positive stop to prevent the saw swinging beyond the edge of table.



SWING SAW

1. Saw well guarded.
2. Belt and pulley guarded. Mesh not standard.

See Industrial Standards—Section I—Page 7.

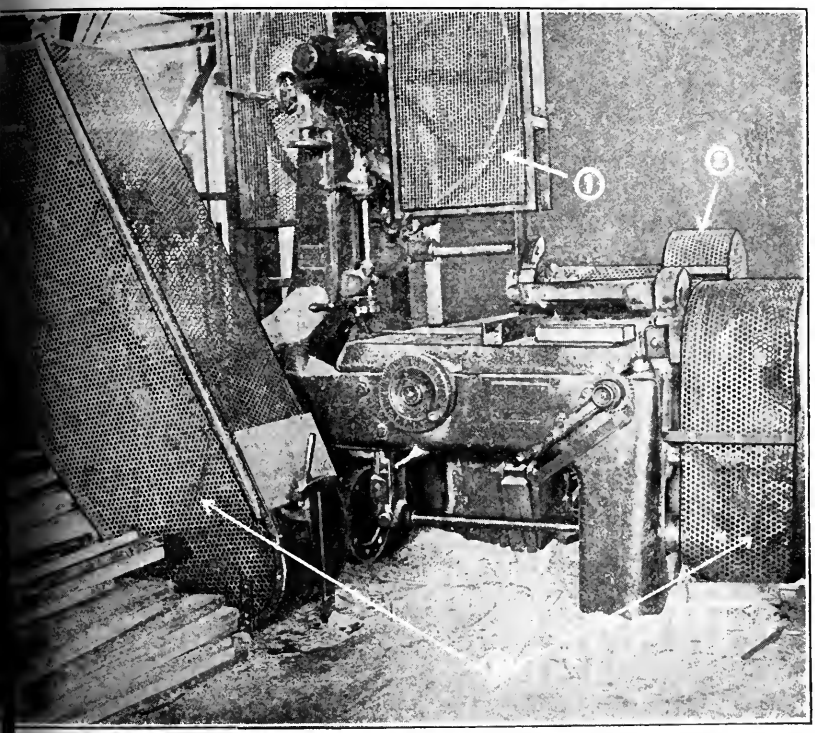


SWING SAW

1. **Saw well covered.** Note hinged lip guard for front of saw.
2. **All moving parts fully guarded.**
3. **Individual drive.**
4. **Safety chain for counterweight.**

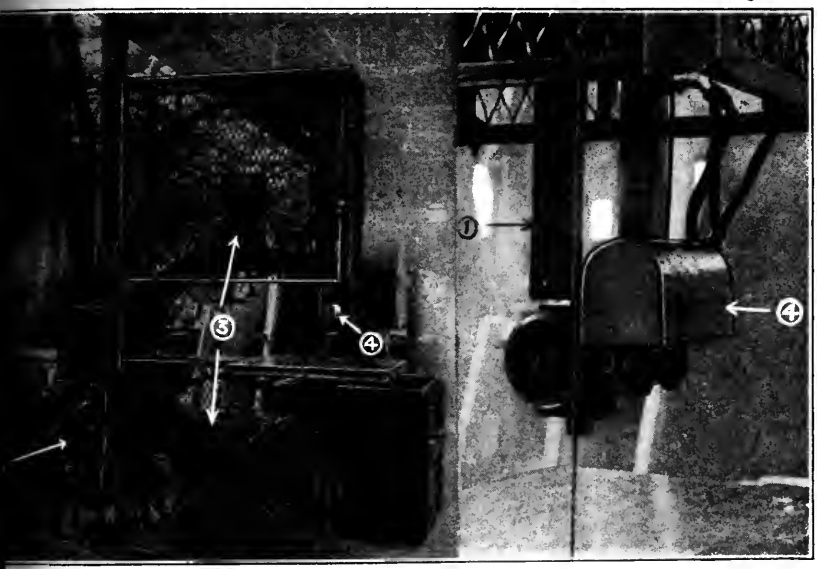
BAND SAW

The guarding of a band saw is not a particularly difficult problem. The spoke hazard and the hazard of a breaking saw can be taken care of by fully enclosing the upper and lower wheels and the return portion of saw. The section of saw where work is done can be protected by a guard attached to the guide and extending upward to the inside of upper wheel guard. This guard, being attached to the guide, will move with it, so that portion of saw between guide and upper wheel will always be protected.



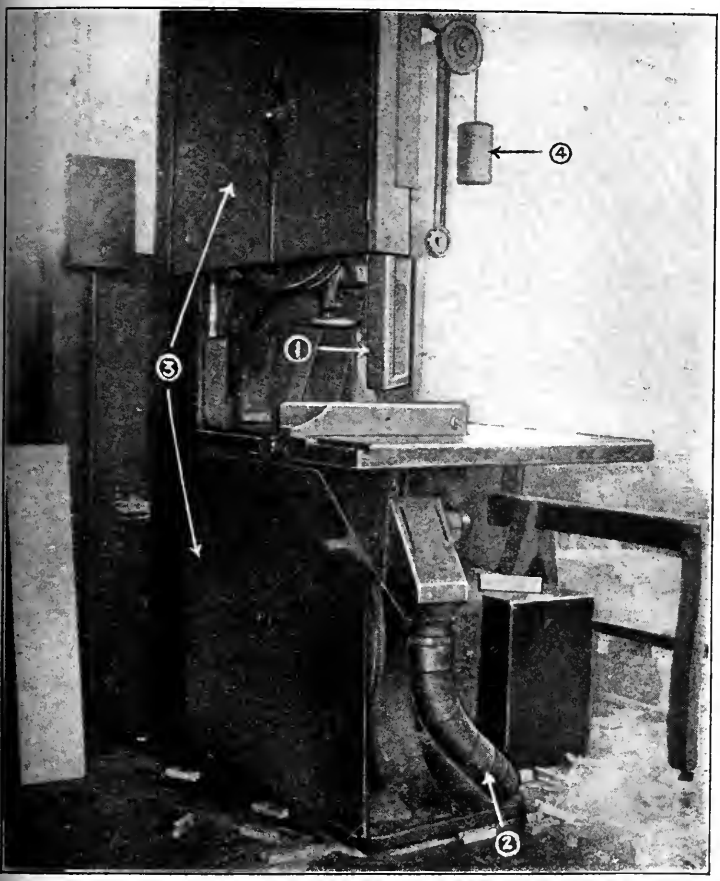
BAND SAW

1. Housing for Band Saw.
2. Feed rolls guarded.
3. Belts and moving parts guarded.



BAND SAW

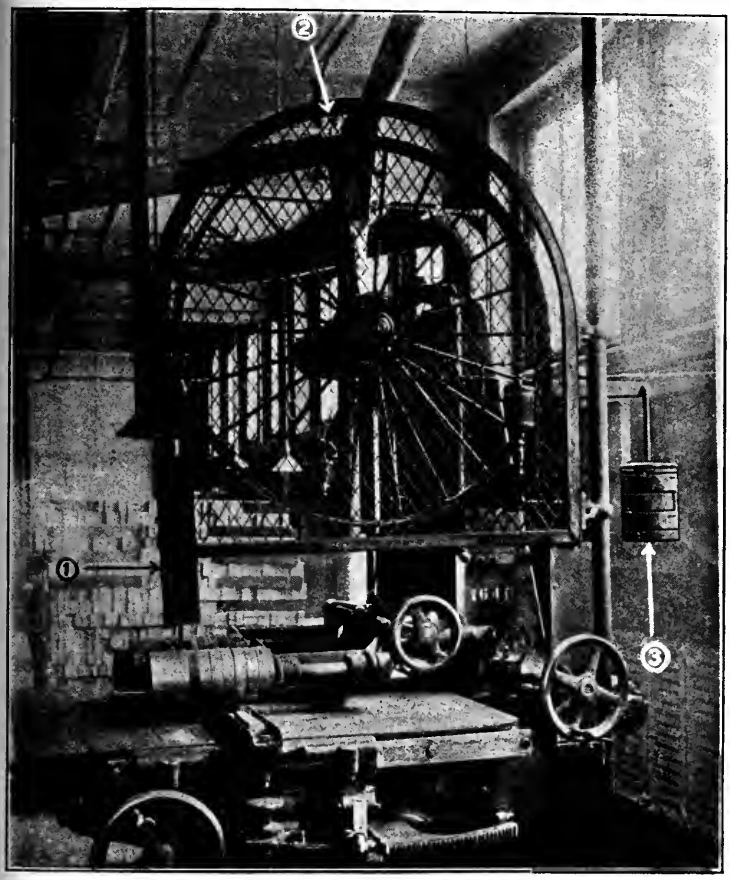
1. Guard attached to guide.
2. Individual drive.
3. Moving parts guarded.
4. Light for point of operation.



BAND SAW

1. Guard for point of operation attached to guide.
2. Exhaust.
3. Moving parts guarded. Guard should extend to lower edge of upper wheel.
4. Counter weight should be guarded.

See Industrial Standards—Section I—Page 8.



BAND RIP SAW

1. Channel iron guard for saw below wheel.
2. Substantial guard for wheel. Mesh not standard.

See Industrial Standards—Section I—Page 7.

3. Counter weight should be guarded.

See Industrial Standards—Section I—Page 8.

BAND SAW

1. Point of operation guarded.
2. Drive belt and pulley guarded.
3. Moving parts guarded.

SECTION VI

JOINTERS

JOINTERS

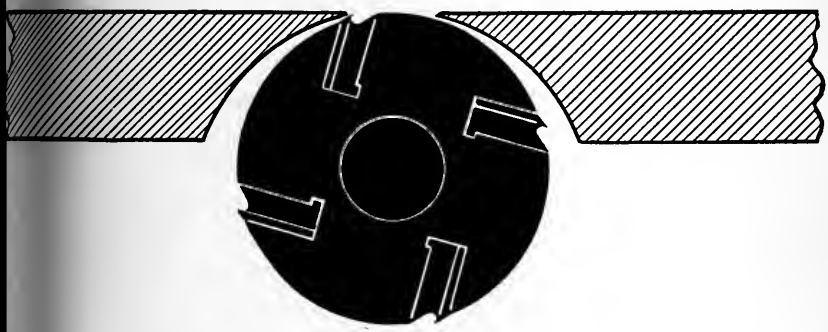
Many of the safeguards in woodworking are open to criticism as to their efficiency. This, however, is not true of the cylindrical cutting head for jointers. While of itself it is not a sufficient guard, it should always be used on all jointers and in all other types of machines where it is practicable. The cylindrical cutting head will, in most cases, reduce the seriousness of any accident that may occur on it as compared to a similar accident on a square cutting head.

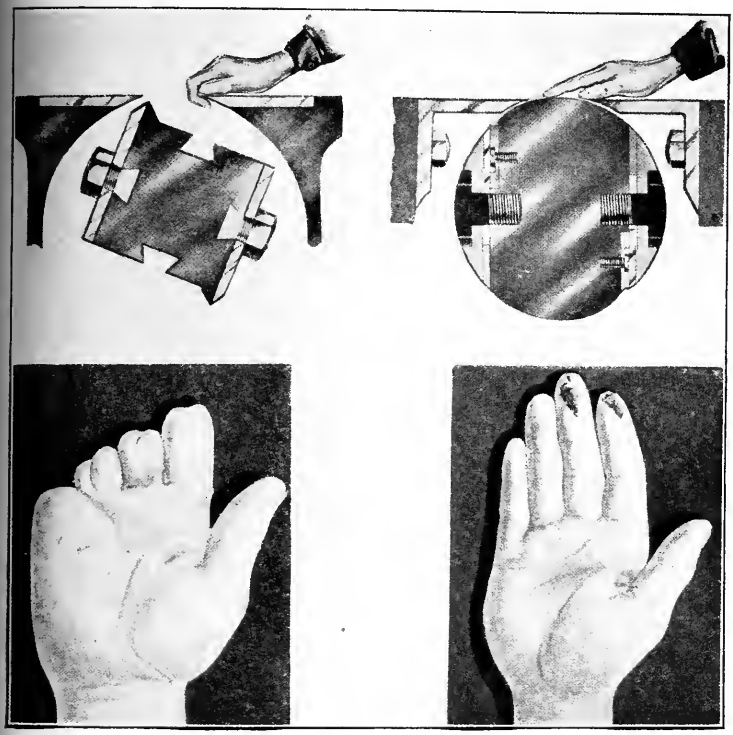
In addition to the round head a guard should be provided which will cover the knives. Several types are shown, some of which cover the knives at all times (the stock being fed under the guard) while others are pushed aside, the guard covering all of the head which the stock does not cover.

All jointer guards should completely cover that part of the head which is exposed behind the guide.

The planing of short pieces on a jointer is dangerous and should be avoided as much as possible. Where such work is done a push block or some other suitable device should be provided and used. If such a device is used there is no danger of the stock being thrown from operator's grasp and his hands being caught in the machine.

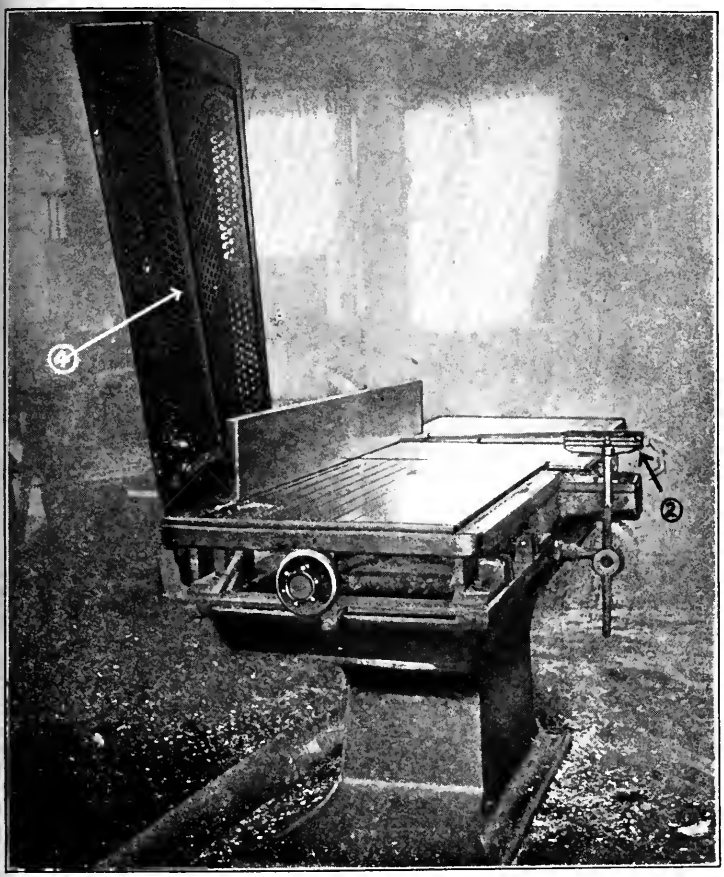
CYLINDRICAL SAFETY HEAD FOR JOINTERS





CYLINDRICAL VERSUS SQUARE JOINTER HEAD

Note the minor injury generally sustained on cylindrical head as compared with loss of fingers on square head.

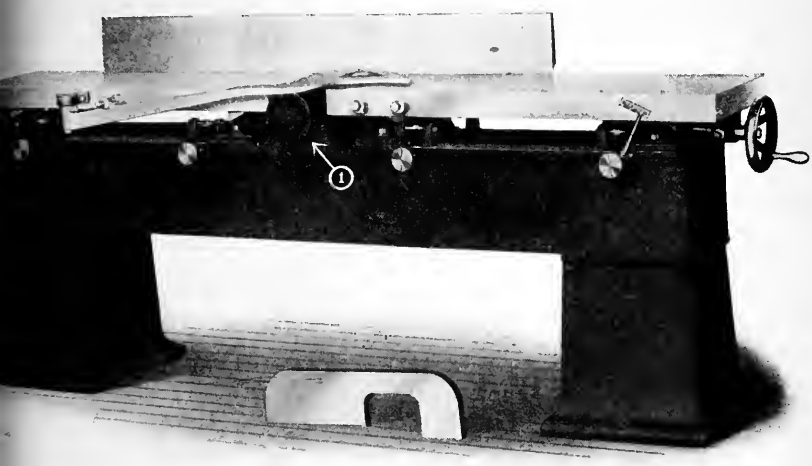


JOINTER

1. Cylindrical cutting head (not shown in illustration).
2. Guard at point of operation.
3. Cutting head covered at rear of guide (not shown in illustration).
4. Driving belt guarded to standard.

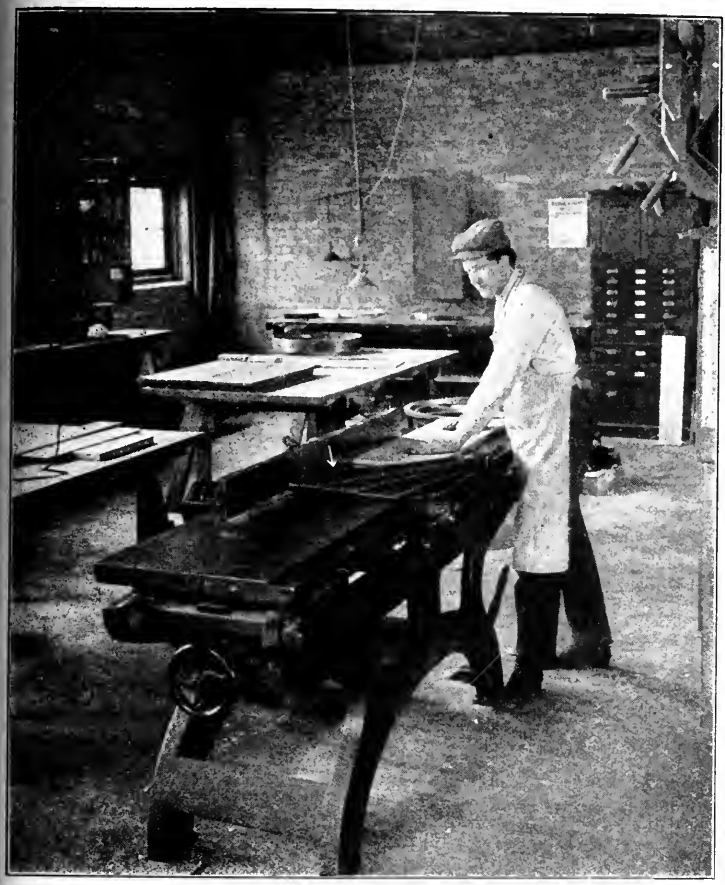
JOINTER

Note cylindrical head and adjustable guard for point of operation.



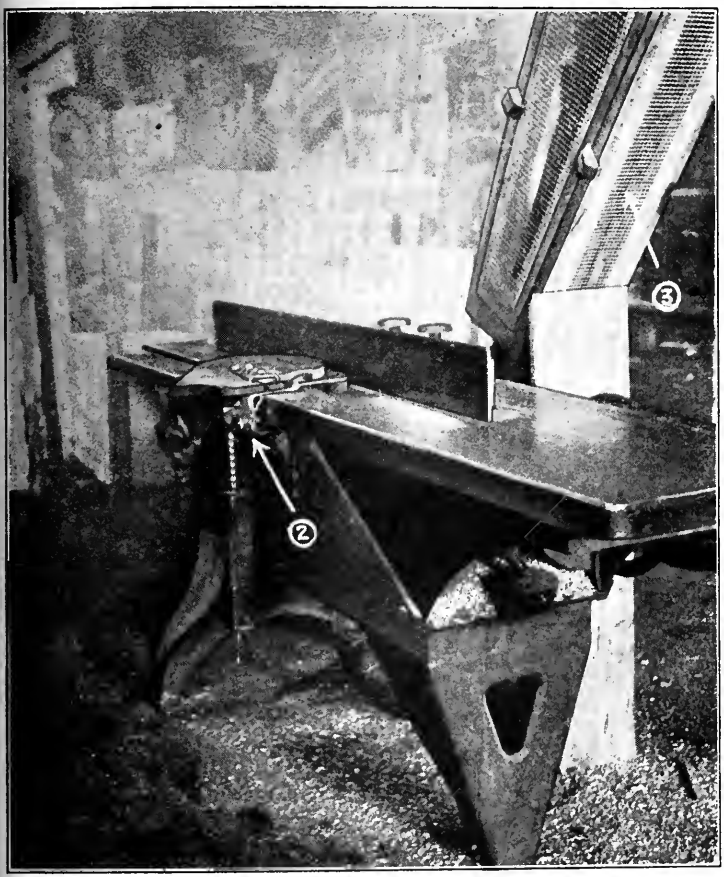
JOINTER GUARD

1. Cylindrical cutter head.
2. Spring actuated guard over cutter head.



JOINTER

An effective guard for the point of operation, automatically adjustable to stock being worked.

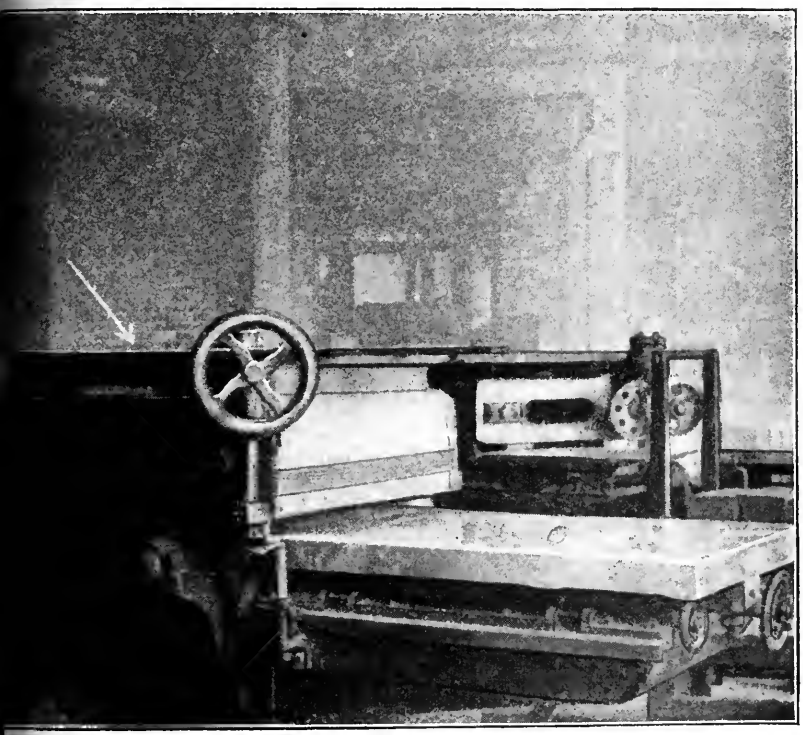


JOINTER

1. Cylindrical cutting head (not shown).
2. Point of operation guarded.
3. Drive belt and pulley guarded.

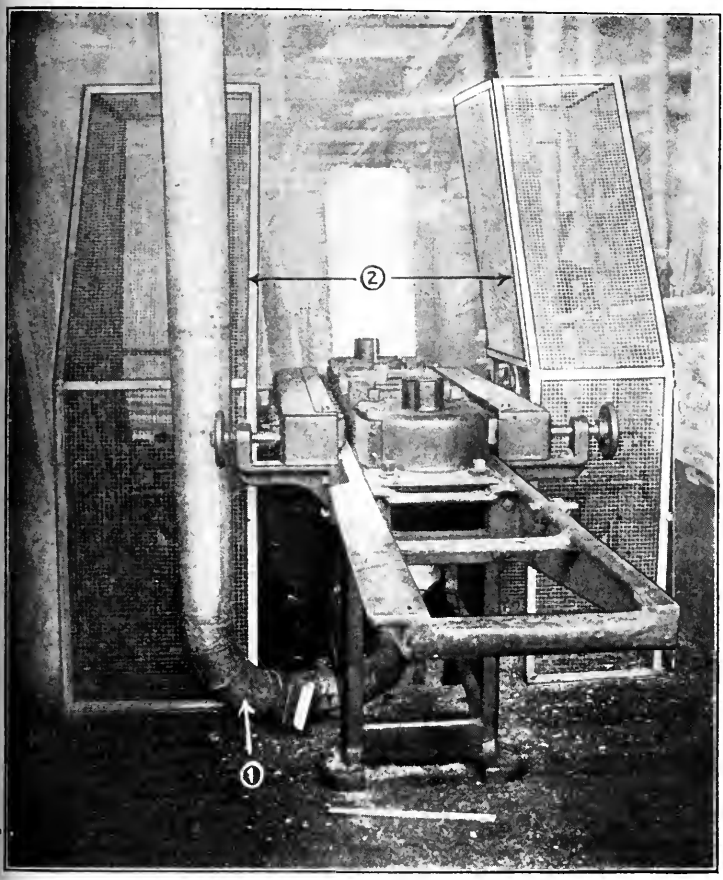
JOINTER GUARD

Guard designed to cover cutting head at all times. Adjustable for different thicknesses of stock.



AUTOMATIC FEED JOINTER

Eliminates hazard of feeding operation.



AUTOMATIC FEED JOINTER

1. Shaving exhaust.
2. Driving belts guarded to standard.

SECTION VII

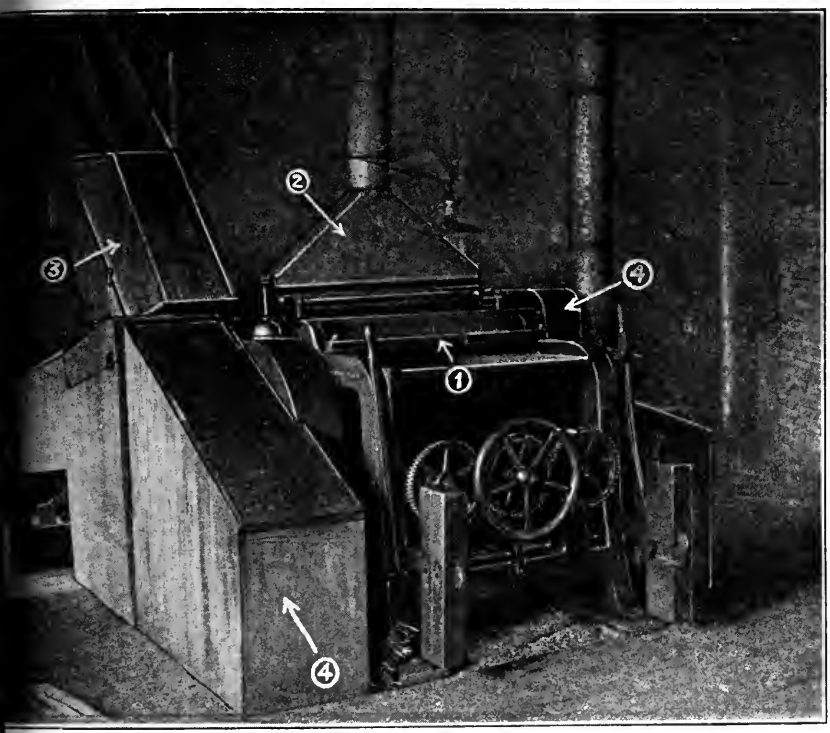
PLANERS

PLANERS

Planers present the hazard of gears, belts and pulleys, and at the point of operation, the hazard of being caught by the feed rolls. The guarding of these parts is comparatively simple, as the following cuts show.

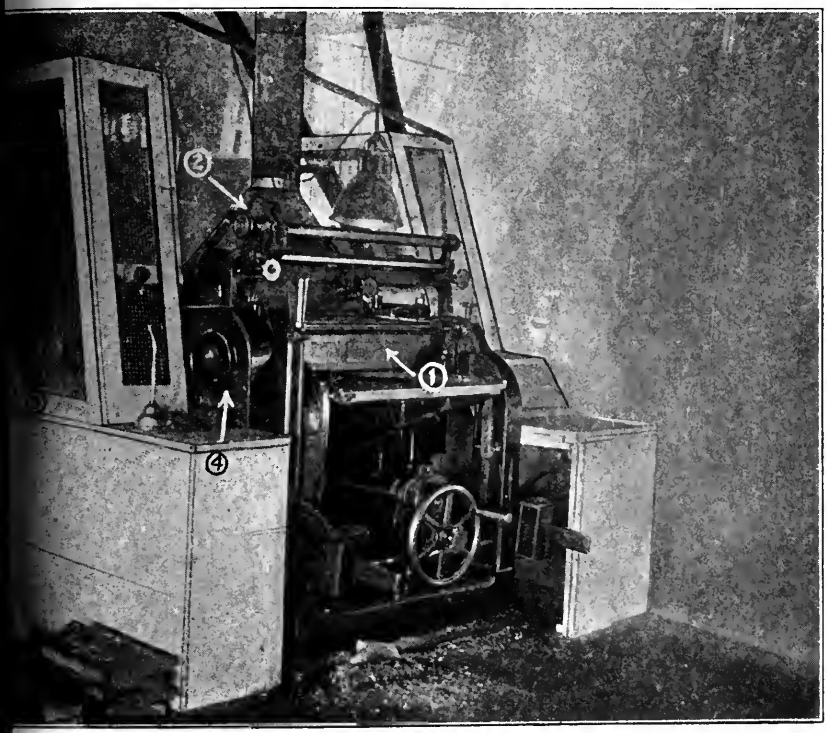
The simplest form of guard for the feed roll is a bar placed at sufficient distance in front of the roll to prevent the hand of the feeder being caught in same.

A better type of guard is shown on pages 10 and 11. This is a sectional guard with fingers so designed as to prevent kick-back of stock while being fed.



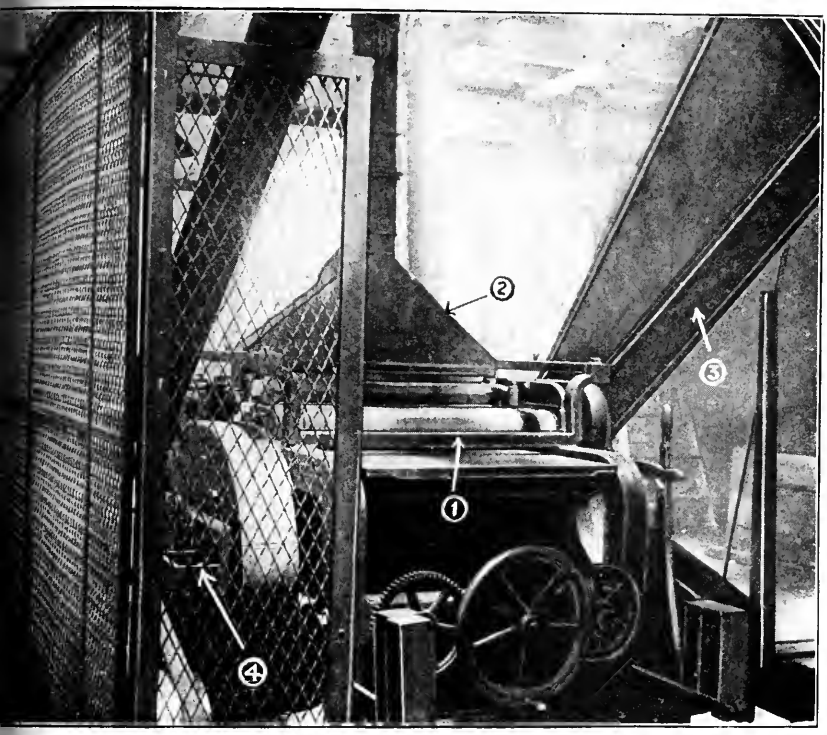
PLANER

1. Guard bar at point of operation.
2. Shaving exhaust hood.
3. Drive belts and pulleys guarded.
4. Moving parts guarded.



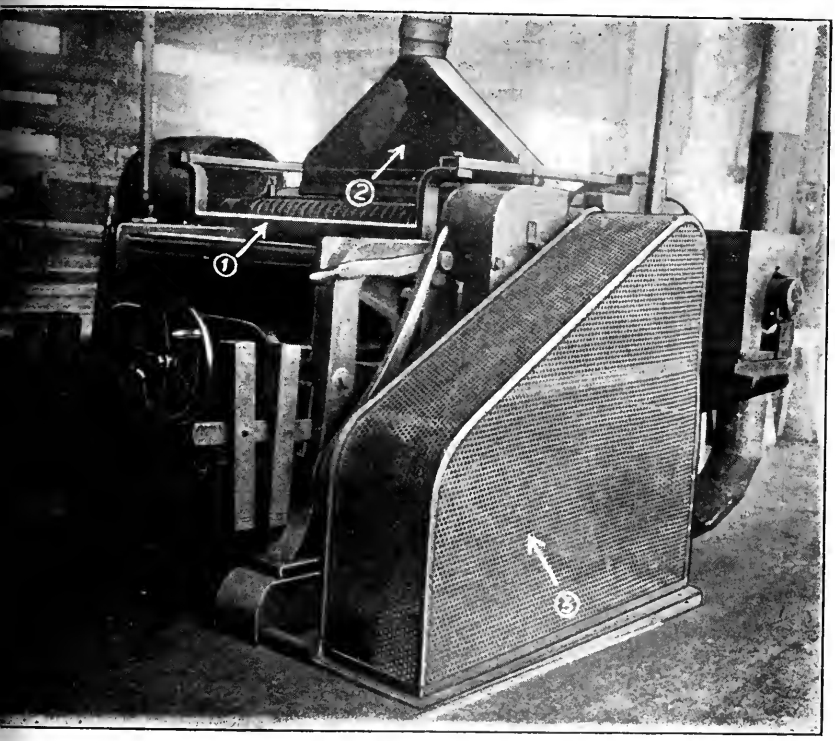
PLANER

1. **Guard bar in front of feed roll.**
2. **Shaving exhaust hood.**
3. **Driving belts guarded to standard.**
4. **Feed gears and other moving parts guarded to standard.**



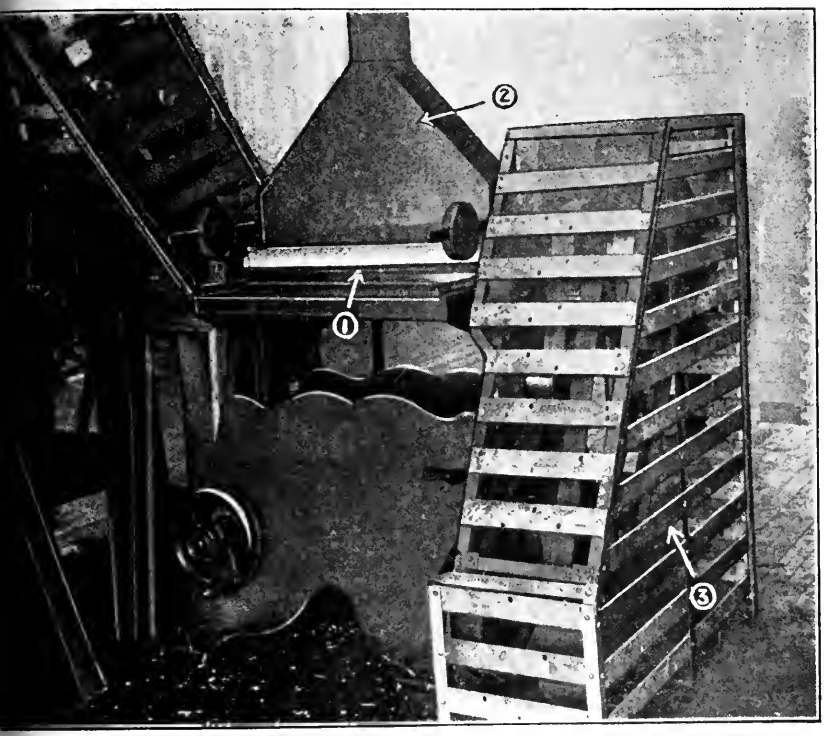
PLANER

1. Guard bar in front of feed roll.
2. Shaving exhaust.
3. Driving belts guarded to standard.
4. All moving parts guarded to standard.



PLANER

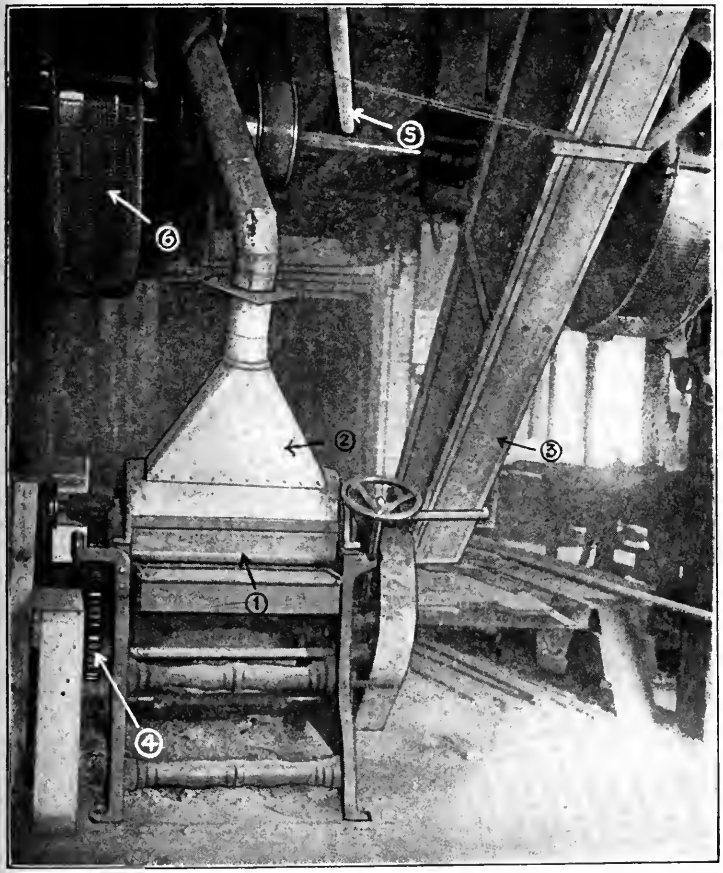
1. Guard bar in front of feed roll.
2. Shaving exhaust.
3. Machine belts and moving parts guarded to standard.



PLANER

1. Guard bar in front of feed roll.
2. Shaving exhaust.
3. Substantial belt guards but sub-standard. Too much space between slats.

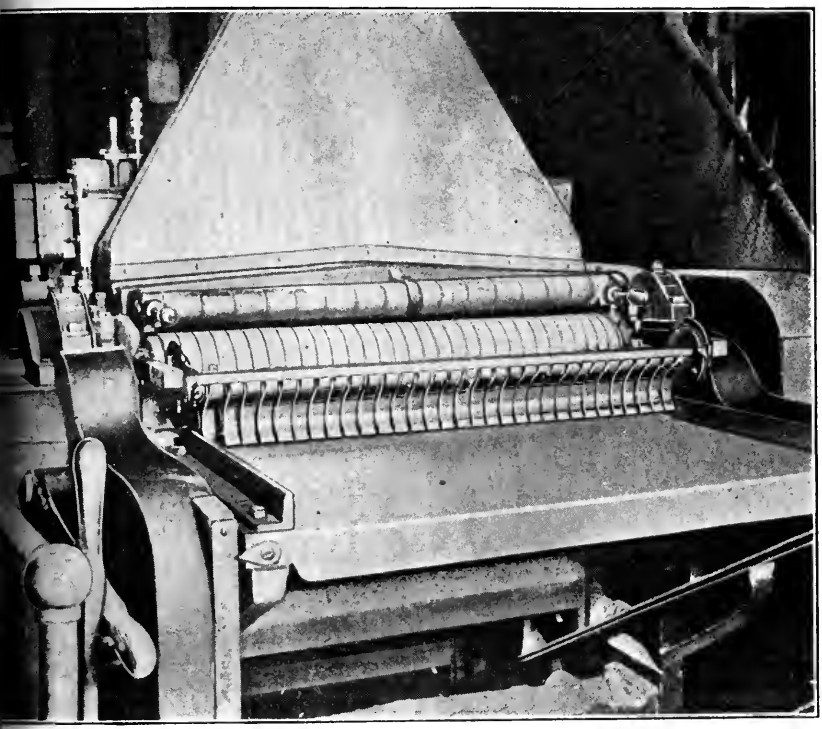
See Industrial Standards—Section I—Page 7.



PLANER

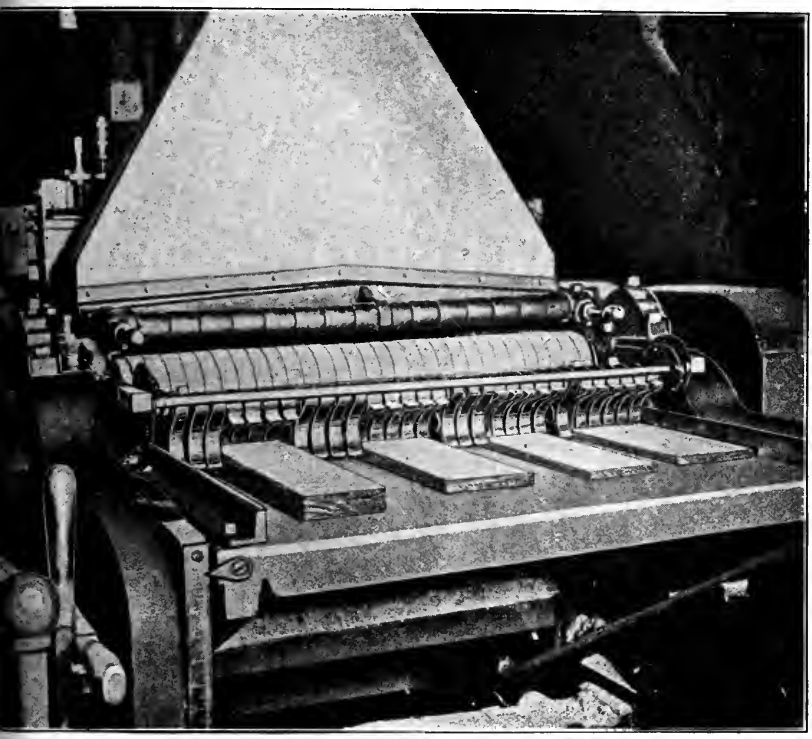
1. Guard bar in front of feed roll.
2. Shaving exhaust.
3. Driving belt guarded by a solid enclosure.
4. Feed gears unguarded, should be enclosed.

5. Note angularity of belt shifter which necessitates fastening lever in off position. The lever should be arranged to hang vertically when the driving belt is on the idler pulley.
6. Note the efficient guarding of overhead pulleys on main line shaft.



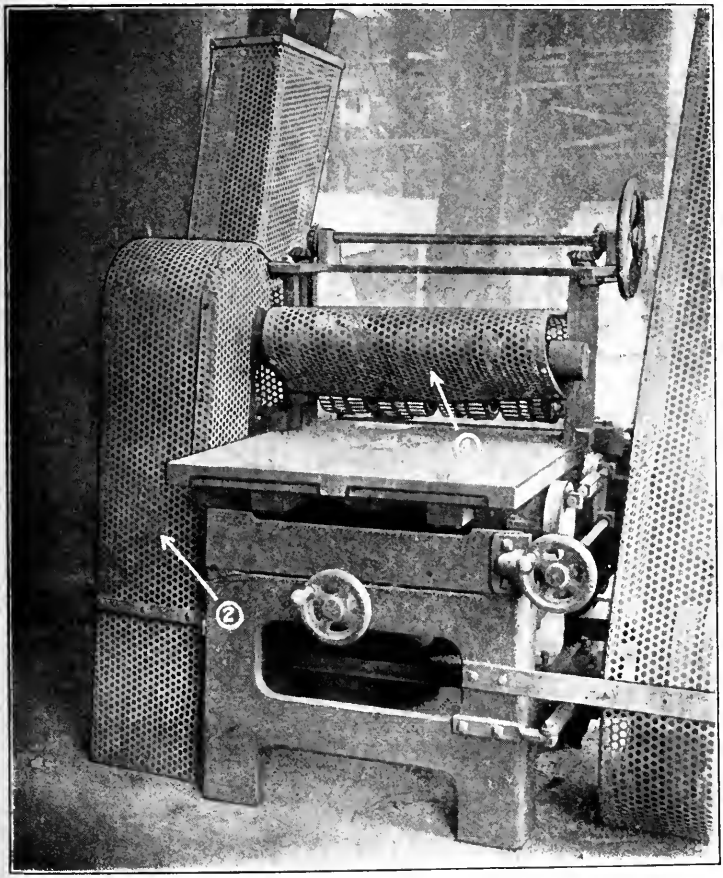
PLANER GUARD

Sectional guard with fingers so designed as to prevent kick-back of stock.



PLANER GUARD

Showing stock in position.



PLANER (Undercut Type)

1. **Feed rolls guarded.**
2. **Driving belts** and all moving parts guarded to standard.

SECTION VIII

SHAPERS

SHAPERS

Shapers are used for such a variety of work that it is difficult to find a guard suitable for all conditions. On the following pages are shown a number of guards which are being used with satisfactory results.

There are a number of points regarding these machines which should be emphasized. The machines run at high speed and should be of rigid construction and located where vibration is reduced to a minimum.

The knives should be set carefully in the spindle and securely fastened.

Suitable exhaust hoods should be provided.

Where guides are used they should be securely fastened.

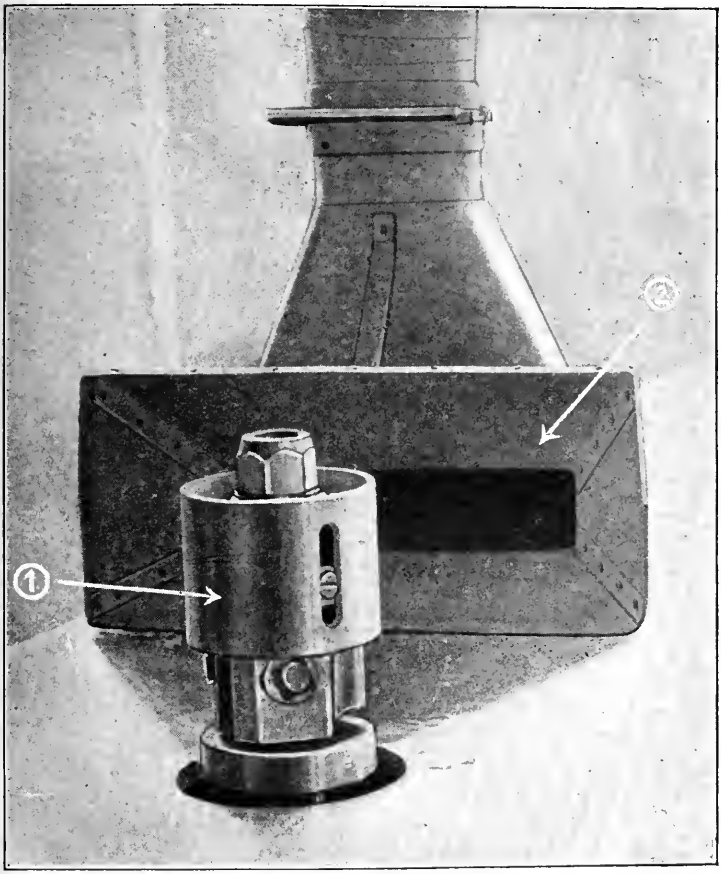
Whenever possible, clamping forms should be used that will not necessitate the hands of the operator coming close to the cutting head.

Operators should wear clothing with short or tight-fitting sleeves, and should be cautioned against allowing their attention to be distracted from their work.

Freedom from rubbish or waste material about these machines is another important factor to be kept in mind.

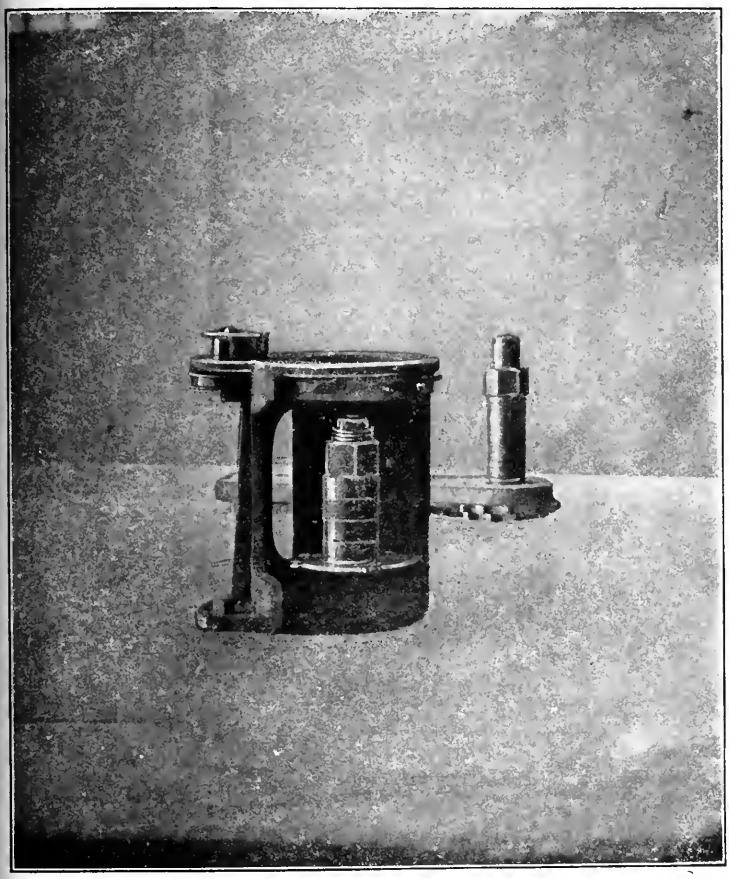
Belts, pulleys, etc., should be guarded. Frequently on this type of machine the radial belts under table are found unguarded. These should be enclosed.

The foreman should see that these points are brought to the attention of the workmen and that all rules are obeyed.



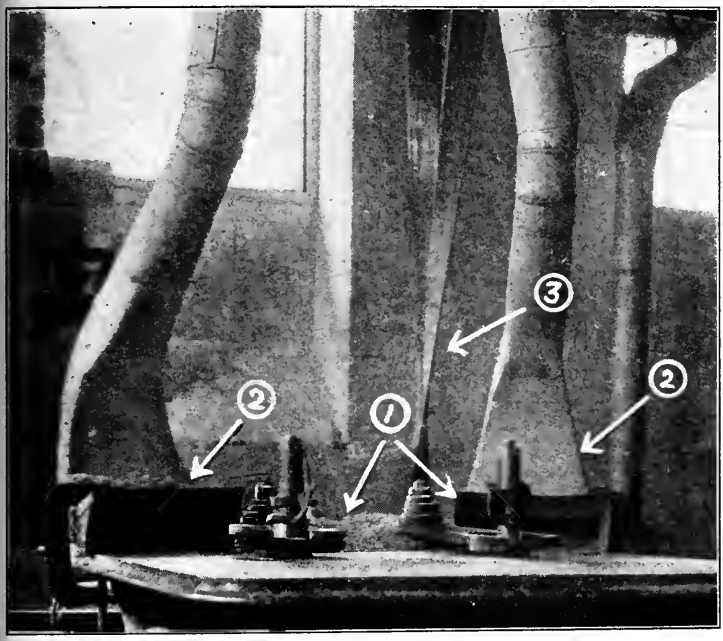
SHAPER GUARD

1. Cutting blades guarded by heavy cylinder, which is adjustable for various thicknesses of stock.
2. Exhaust hood.



SHAPER GUARD

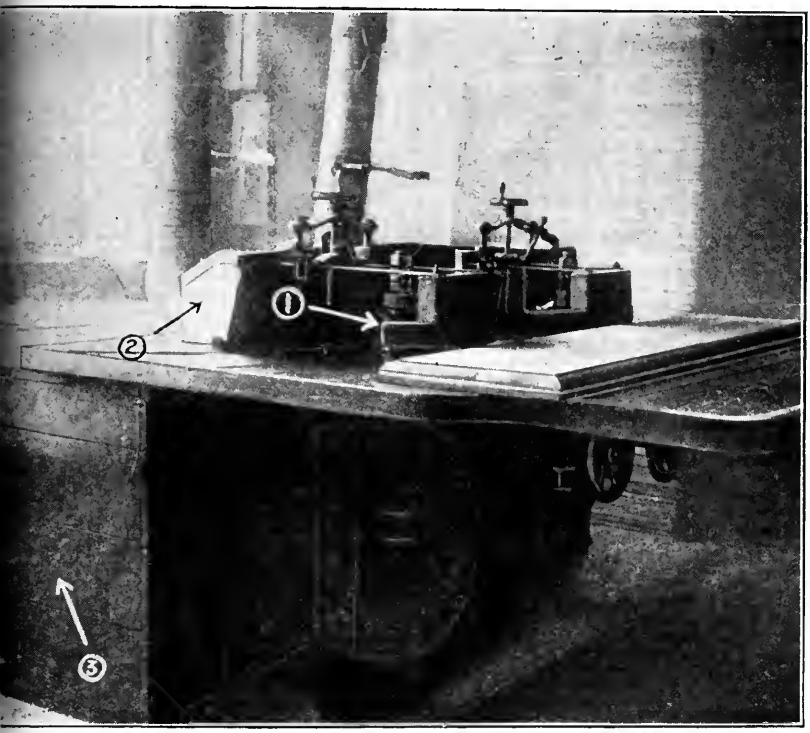
Shutter type guard actuated by spring whose tension is adjustable. Cutter blades normally covered. Guard held back when in use by stock being worked.



SHAPER

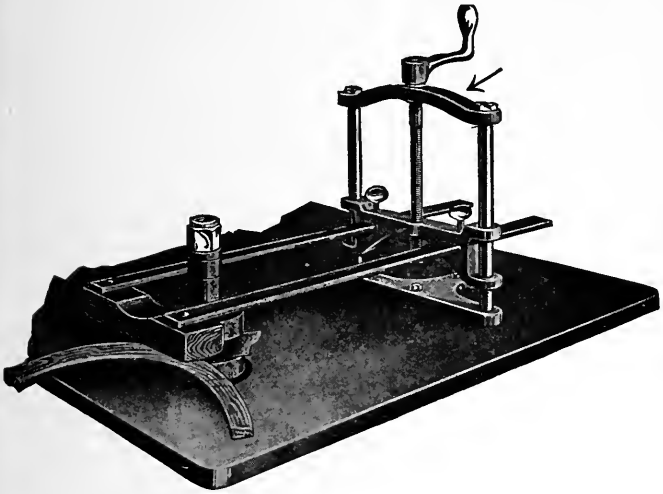
1. Guard for point of operation.
2. Shaving exhaust hood.
3. Driving belt not guarded.

See Industrial Standards—Section I—Page 7.



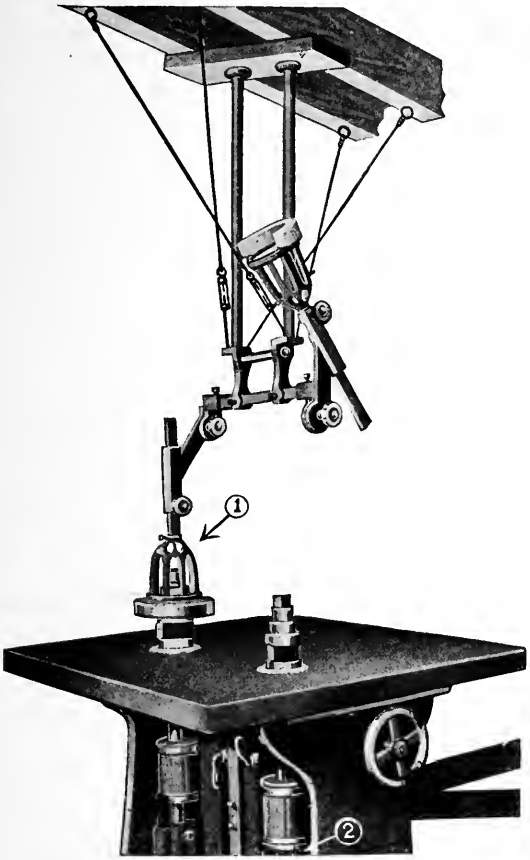
SHAPER

1. Adjustable guard for point of operation.
2. Shaving exhaust hood.
3. Driving belts and pulleys guarded to standard.



SHAPER GUARD

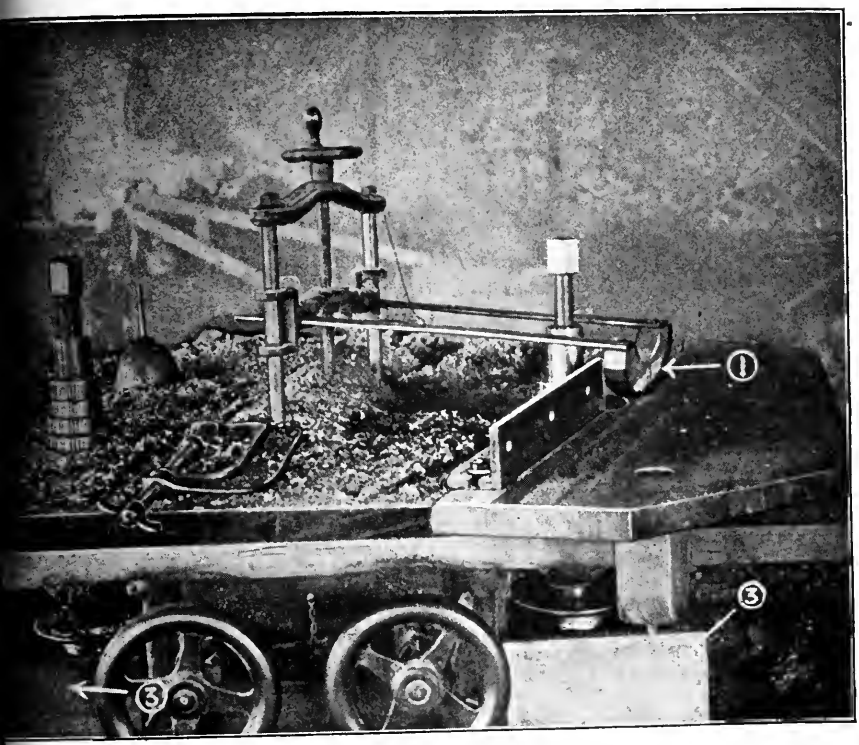
Note arrangement for quick adjustment.



SHAPER

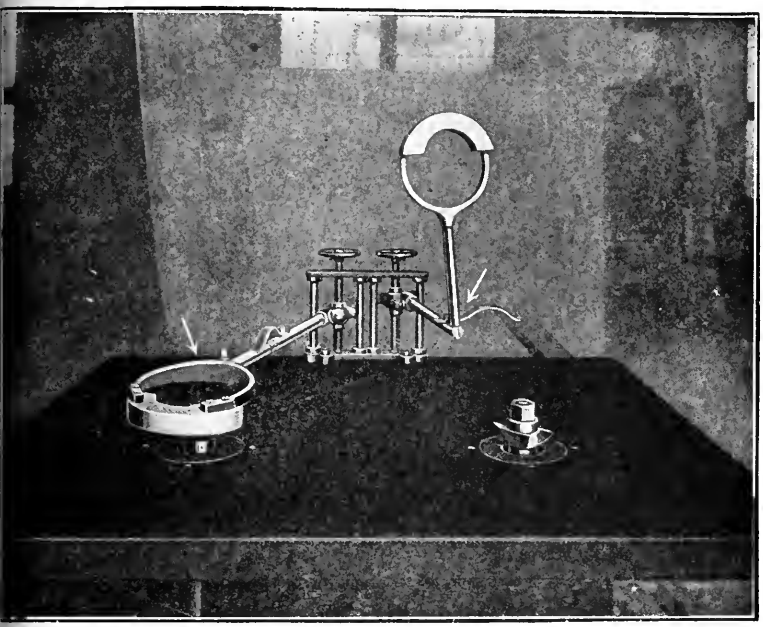
1. Adjustable guard for point of operation.
2. Belts and pulleys should be guarded.

See Industrial Standards—Section I—Page 7.



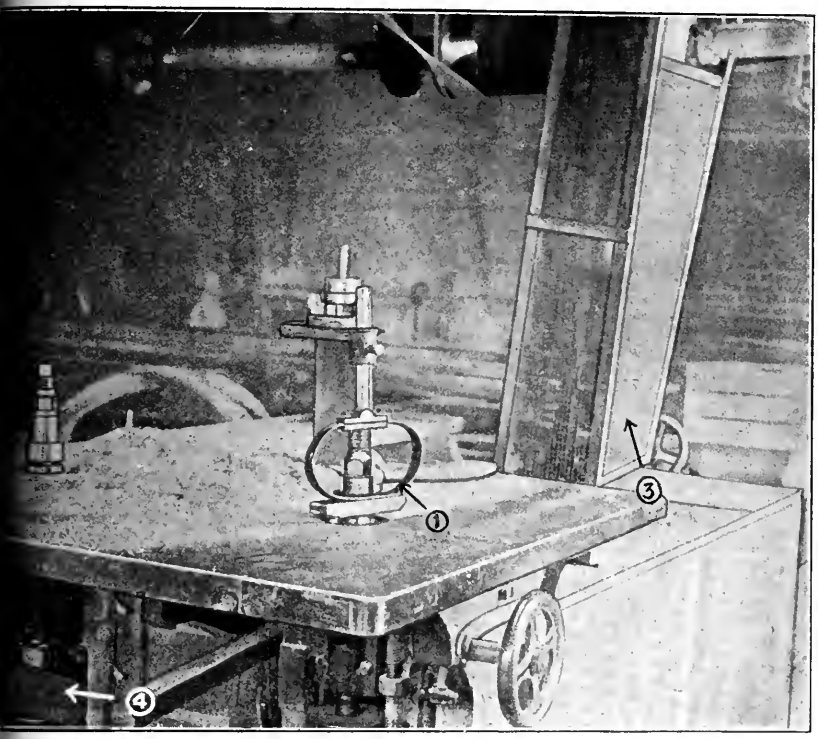
SHAPER

1. Guard for point of operation.
2. Note accumulation of chips and shavings and absence of exhaust hood.
3. Guards for radial belts beneath table.



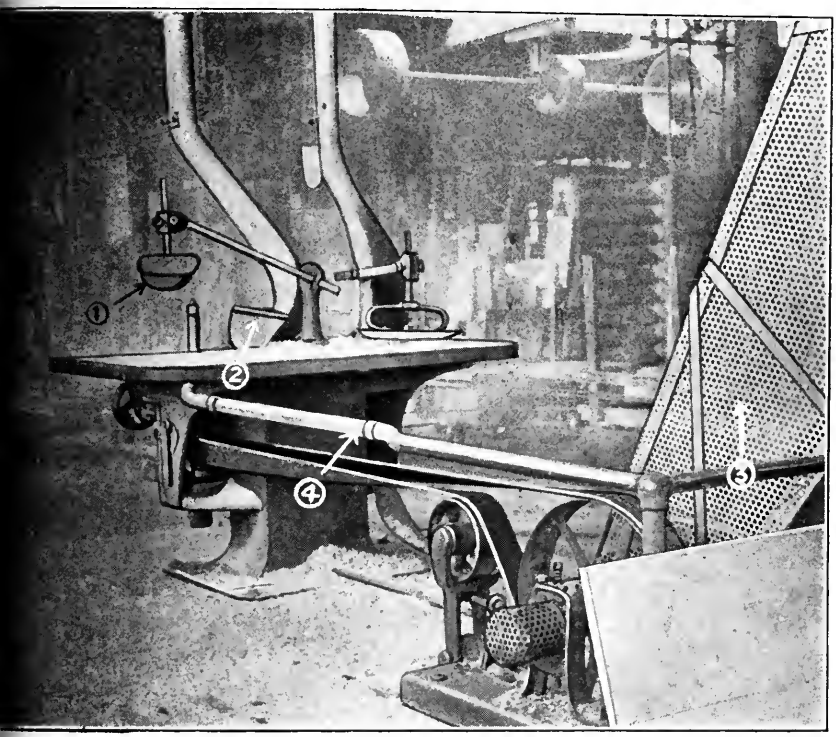
SHAPER GUARD

Guard adjustable for various thicknesses of stock. Hinged arm permits ready access to cutter blades.



SHAPER

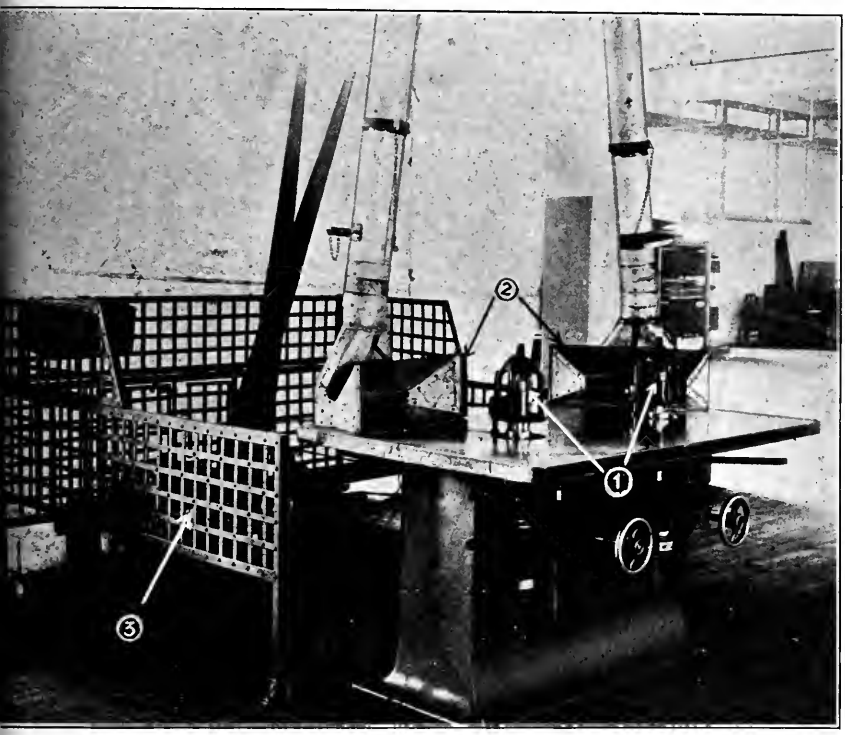
1. Guard for point of operation.
2. Note condition of table due to absence of exhaust hood for removal of chips.
3. Driving belt guarded to standard.
4. Radial belts under table unguarded.



SHAPER

1. Guard for point of operation (not in position).
2. Shaving exhaust hood.
3. Driving belt from counter shaft to jack shaft guarded to standard.
4. Floor belts, guarded by single rail only, should be enclosed from rail to floor.

See Industrial Standards—Section I—Page 7.



SHAPER

1. Guard for point of operation.
2. Exhaust hoods (not in position).
3. Substantial but sub-standard metal guard for belts and pulleys.

See Industrial Standards—Section I—Page 7.

SECTION IX

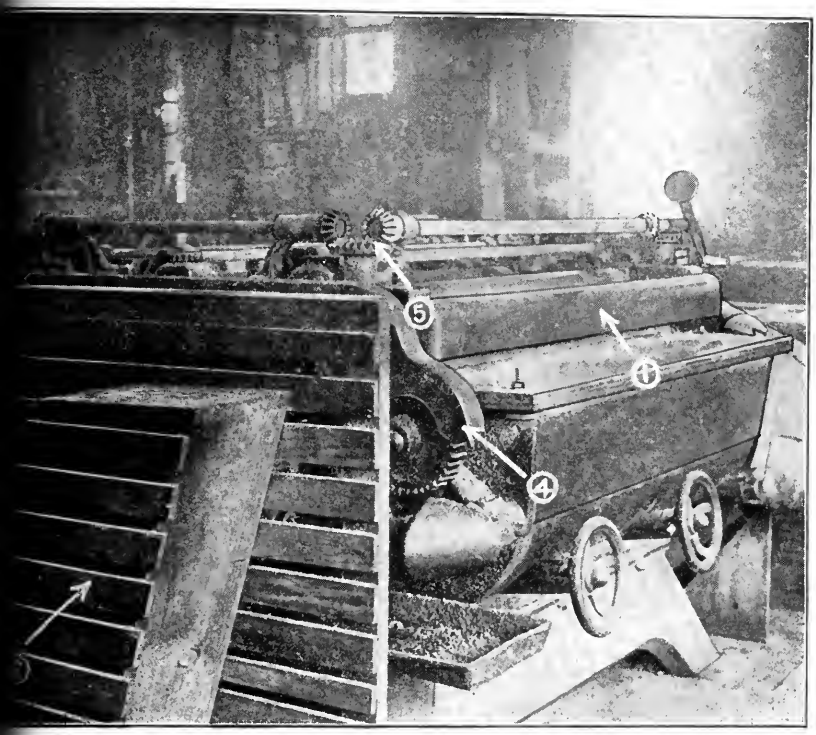
SANDING MACHINERY

SANDING MACHINERY

The danger at point of operation on machines and devices for sanding purposes is not important in comparison with woodworking machines having a cutting action. To offset this hazard, however, the dust thrown off from the operation is objectionable, and every possible means should be taken to collect and remove this dust as rapidly as formed.

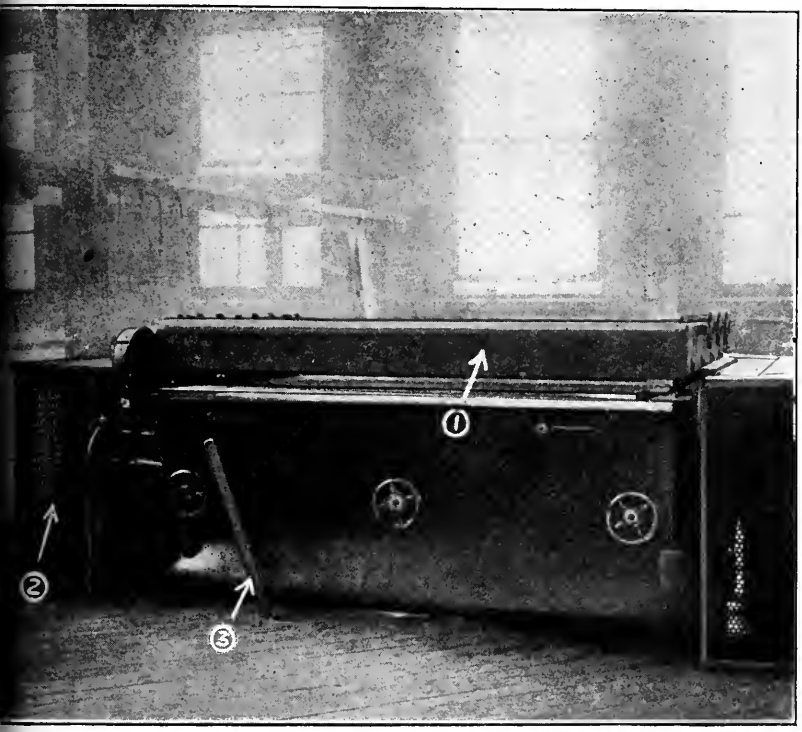
Roll feed sanders should be provided with a guard bar in front of feed rolls.

These machines are also operated at high speed and all belts, pulleys and moving parts should be completely and substantially guarded.



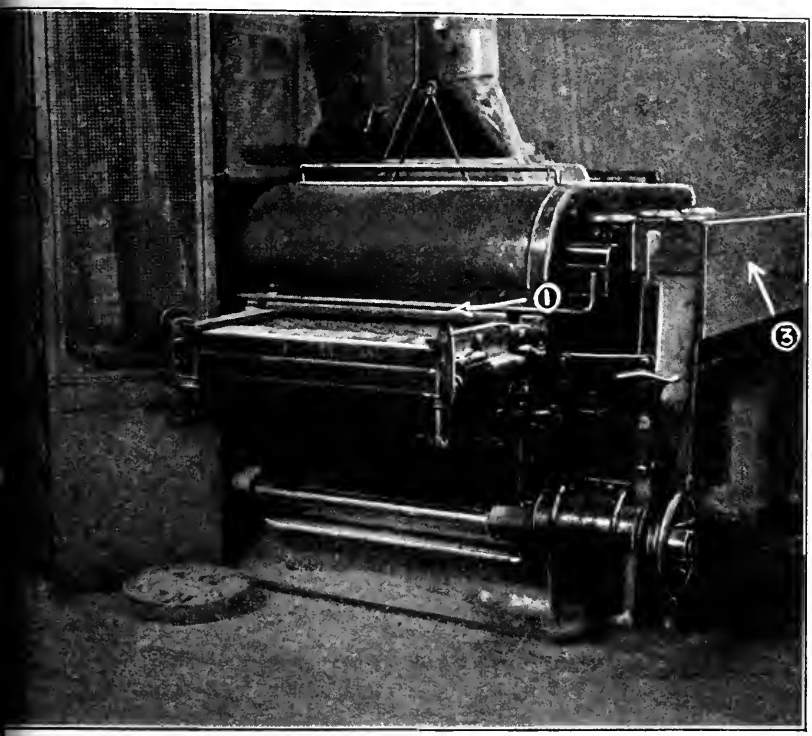
ROLL FEED SANDER

1. Guard bar in front of feed roll.
2. The exhaust suction hood for removal of dust is not shown in illustration.
3. Driving belts substantially guarded.
4. Gear guard inadequate and should be extended to completely cover gear.
5. Adjusting gears not power driven and guard unnecessary.



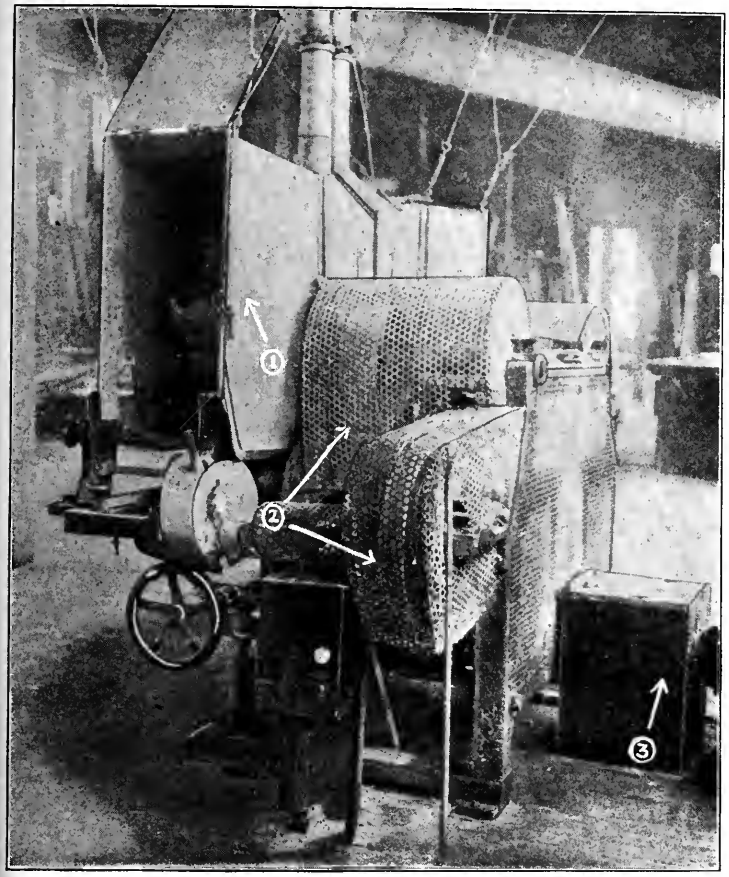
ROLL FEED SANDER

1. An effective protection for feed roll.
2. Driving belts and pulleys guarded to standard.
3. Belt shifter extending through floor.



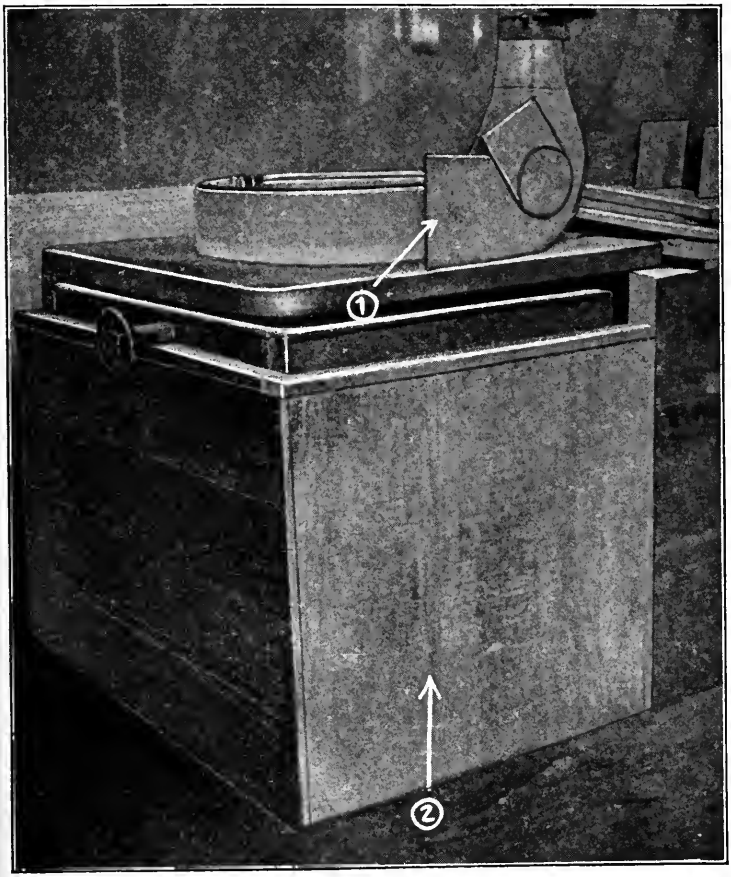
ROLL FEED SANDER

1. Point of operation guarded.
2. Drive belts and pulleys guarded to standard.
3. Gears substantially guarded.



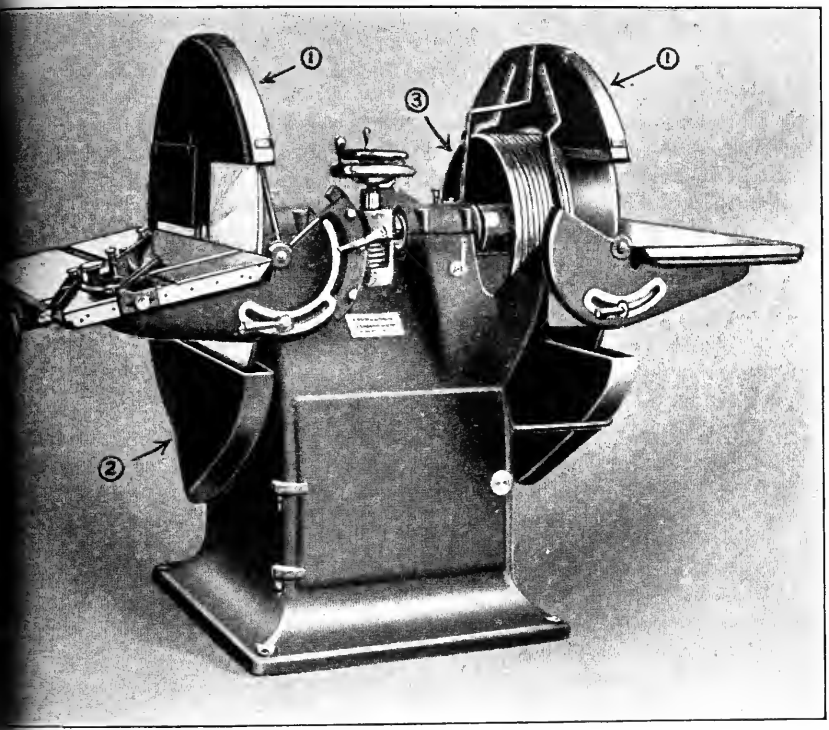
MOULDING SANDER

1. The exhaust hood is extensive and well arranged to collect and remove all dust generated in the sanding operation. The feed is automatic and the possibility of an accident at the point of operation is practically negligible.
2. Driving belts and pulleys guarded to standard.
3. Shaft drive and coupling guarded to standard.



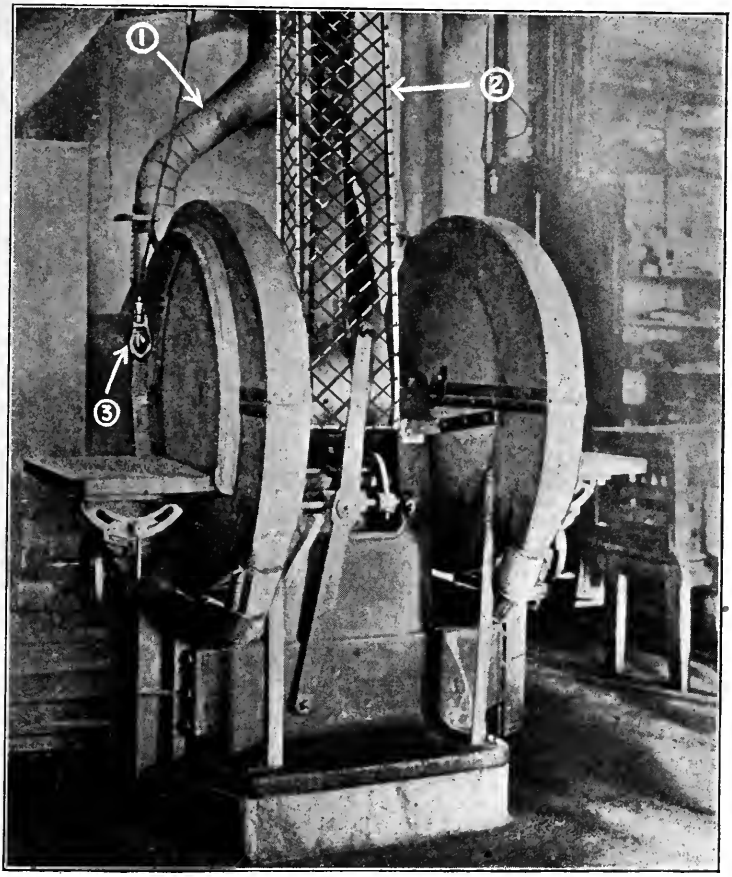
DRUM SANDER

1. Exhaust.
2. Belts and pulleys well guarded.



DISC SANDER

1. Hoods over discs.
2. Exhaust hoods underneath table. Exhaust piping not attached.
3. Belt and pulley should be enclosed when belt is put on.

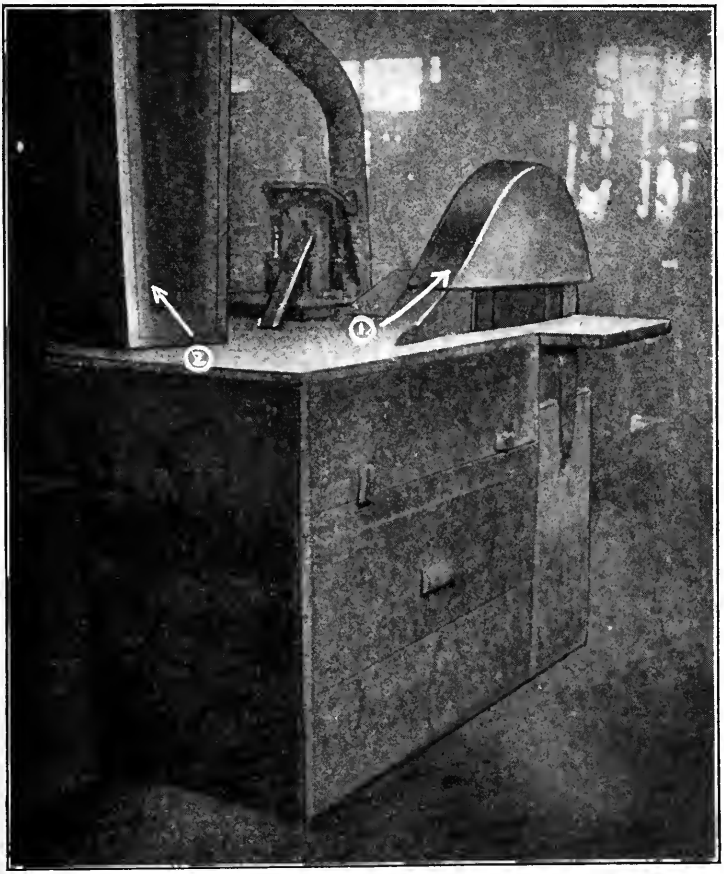


DISC SANDER

1. Well-designed exhaust hoods.
2. Driving belt guard not standard.

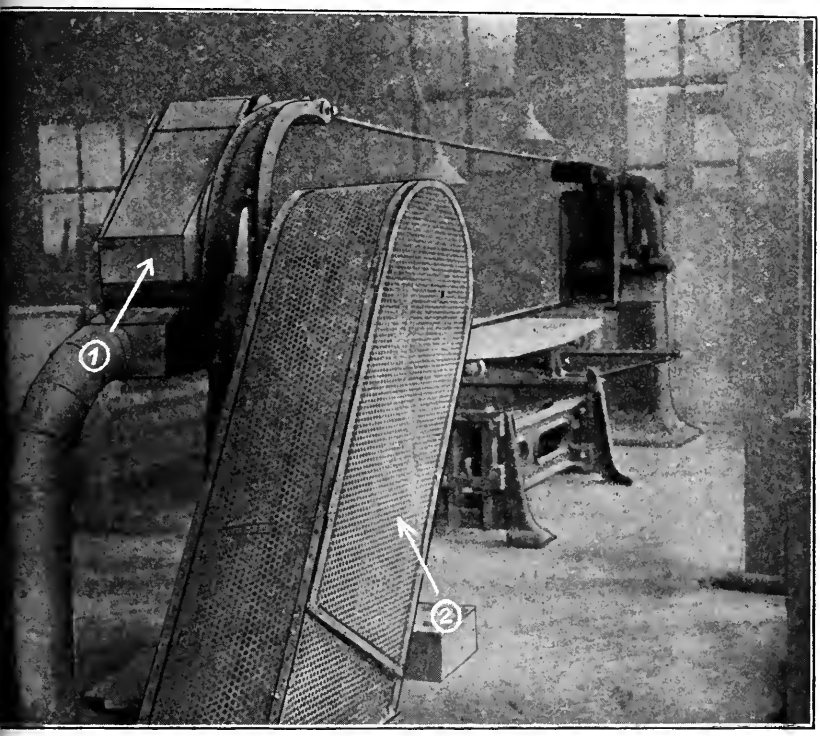
See Industrial Standards—Section I—Page 7, for size of mesh.

3. Lamp should be equipped with shade.



DISC SANDER

1. Disc well covered by exhaust hood.
2. Drive belt and pulley guarded to standard.



BELT SANDER

1. The exhaust suction hood is arranged and located advantageously to collect and eliminate the dust which is conducted to it by the air current generated by the sand belt.
2. Driving belt and pulley guarded to standard.

SECTION X

BORING MACHINERY

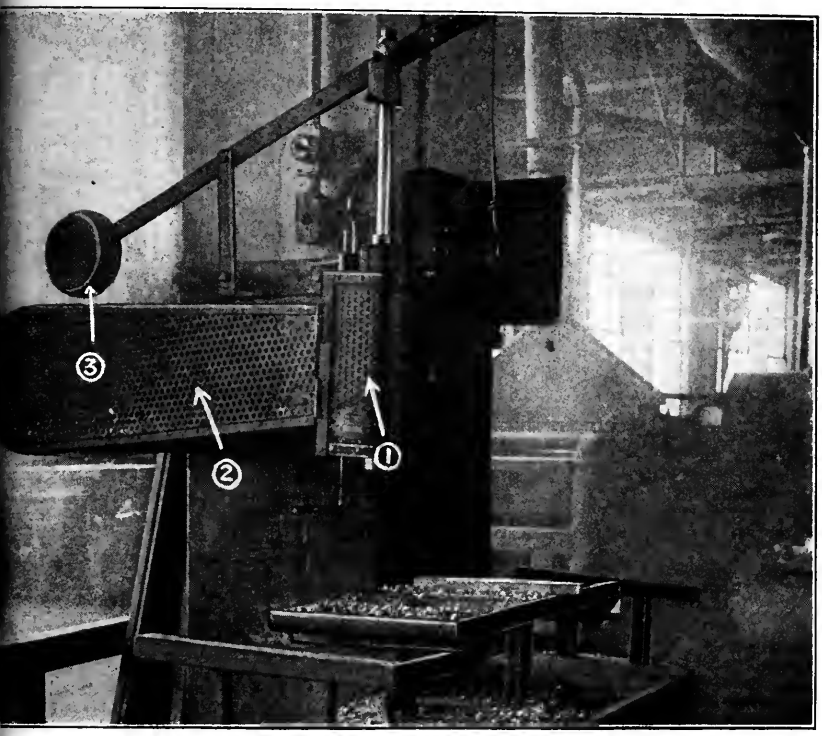
BORING MACHINES AND MORTISERS

The accident exposure on machines of this type is the close proximity to the operators of rapidly revolving and reciprocating parts. The character of the operation requires that the stock being machined be spotted accurately under the cutting tool, and while the operator is so absorbed in his duties it is obviously essential that the spindle and other moving parts of the machines be completely guarded in order to prevent accidental contact.

The revolving chuck holding the tool should be cylindrical with no projections extending beyond its periphery.

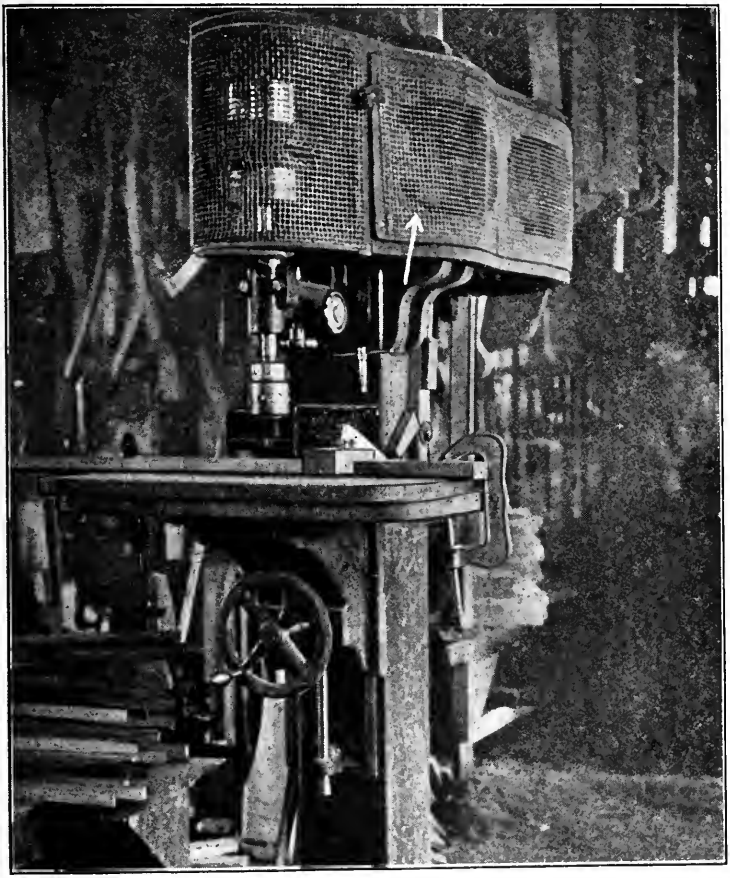
The variable thickness of stock and consequential length of bit or auger, as well as the depth of the holes and recesses, make it rather difficult to provide a shaving exhaust hood to suit every condition. However, the chips and cuttings do not particularly invite an eye injury in such operations.

The pins or bolts holding lever and counterweight should be provided with cotter pins or lock nuts to prevent their loosening and allowing spindle to drop.



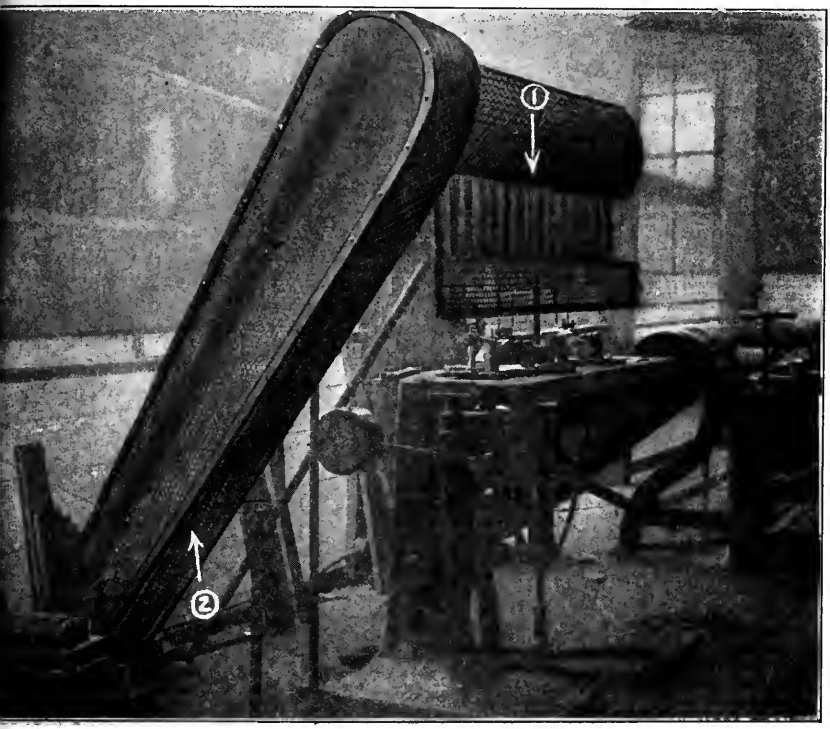
VERTICAL BORING MACHINE

1. Screen guard for spindle.
2. Belt and pulley guarded to standard.
3. A cotter pin should be fitted in the lever back of the counter weight to prevent the weight from becoming detached which would permit the spindle to fall unexpectedly.



VERTICAL BORING MACHINE

Belts and pulleys guarded to standard.

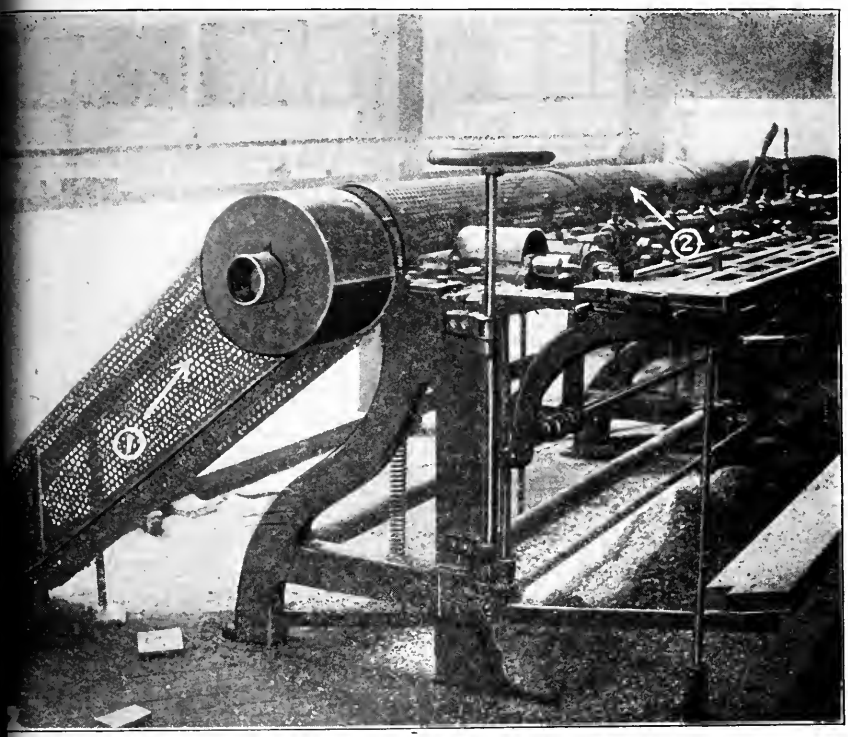


GANG BORING MACHINE

1. Substantial screen in front of spindle and chucks.
2. Driving belt and pulleys guarded to standard.

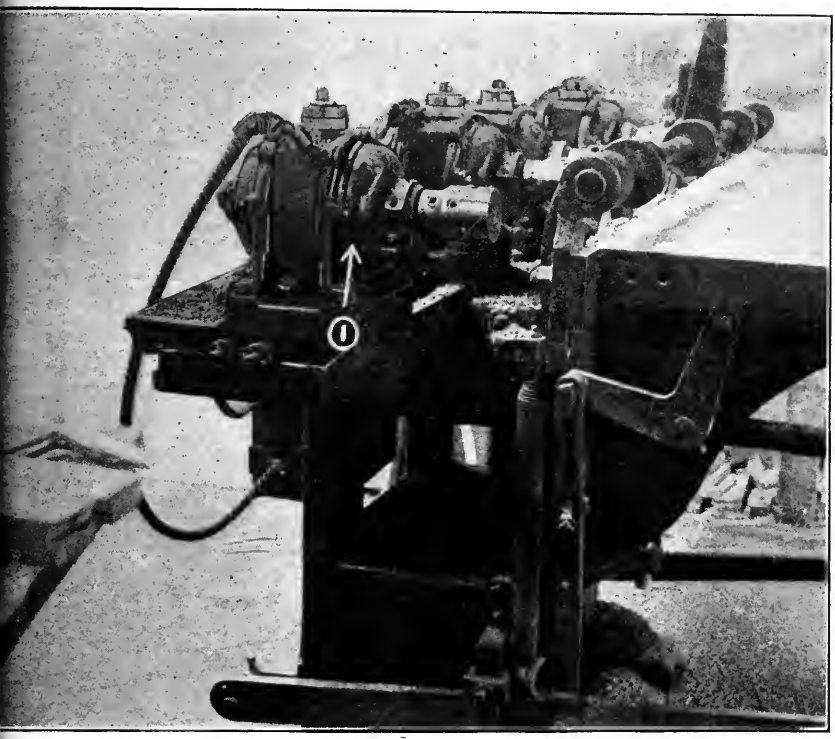
HORIZONTAL BORING MACHINE

1. Point of operation guarded.
2. Driving belt and pulley guarded to standard.



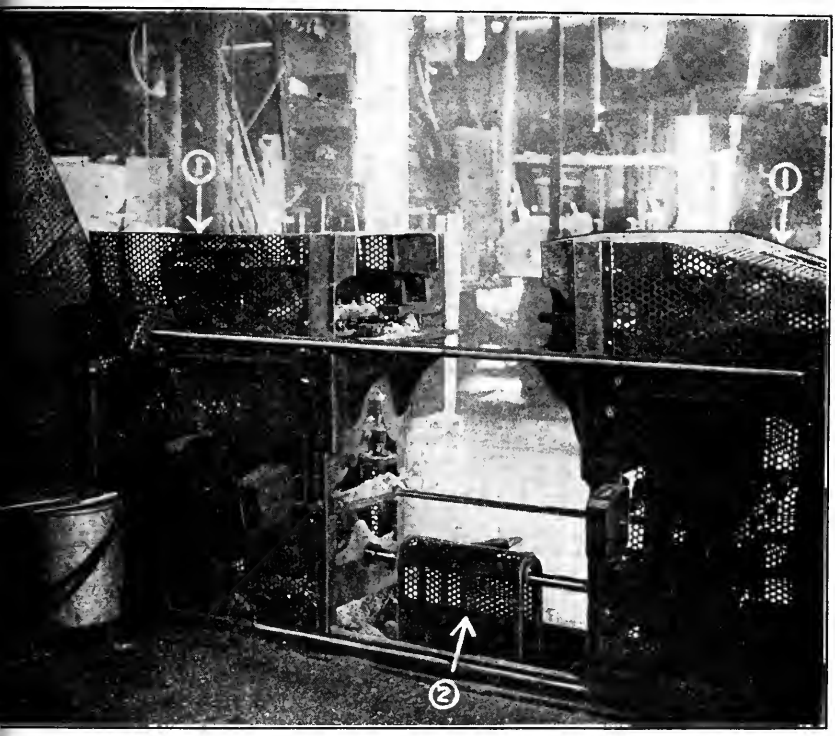
HORIZONTAL BORING MACHINE

1. Driving belt and pulley guarded to standard.
2. Neat fitting screen guard over the moving parts.



HORIZONTAL BORING MACHINE

1. Individual motor for each spindle eliminating all belts and pulleys.
2. This machine is designed for special work and demonstrates the possibility of reducing exposure to a minimum.



DOUBLE-END BORING MACHINE

1. This illustration shows how all belts, pulleys and other moving parts may be completely guarded without decreasing production.
2. The floor shaft guard is sectional and may be telescoped or extended as required.

SECTION XI

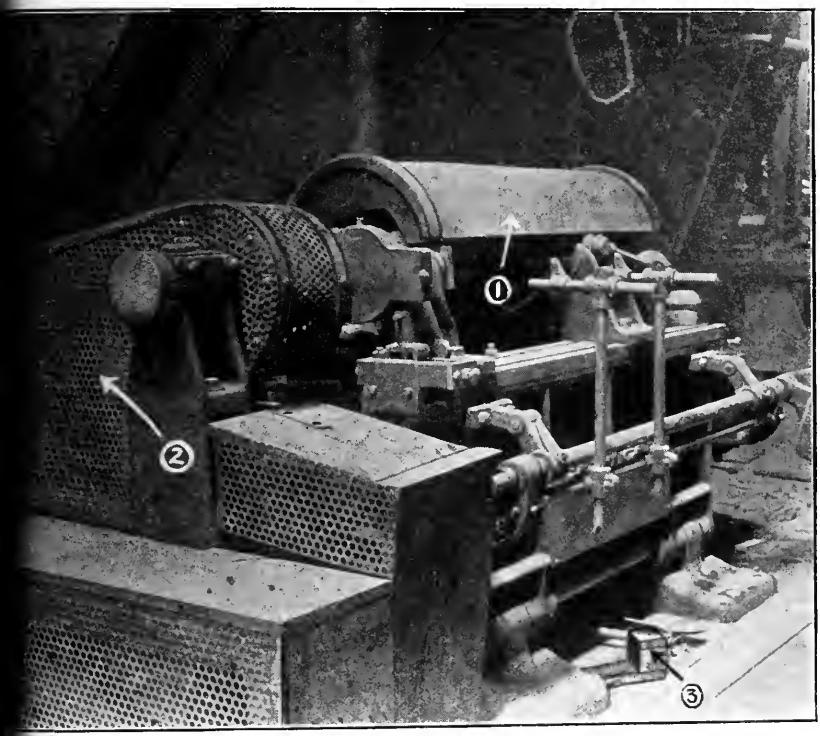
MISCELLANEOUS MACHINERY

MISCELLANEOUS MACHINES

There are many woodworking machines designed for particular classes of work, which have hazards peculiar to themselves. The standards in Section I give dimensions and distances for guards protecting belts, pulleys, gears, etc., but for the point of operation on such machines considerable thought and ingenuity is often required to design a guard which will properly protect the operator.

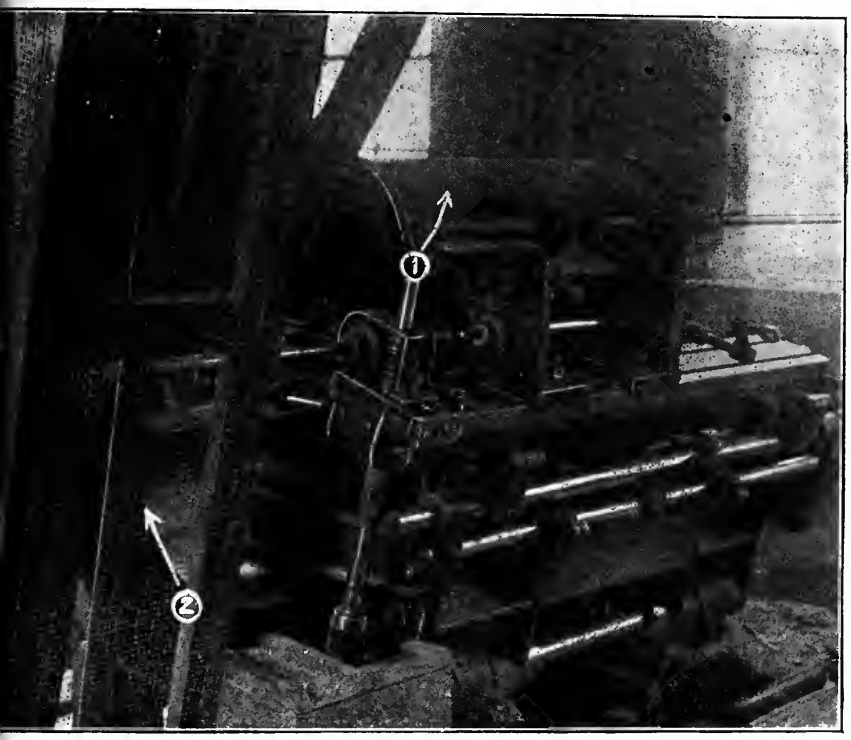
Not only is it necessary to protect him against contact with knives, saws, rolls, or other dangerous parts, but, in many cases, there is the additional hazard of kick-back of stock, flying chips, dust, etc. On some machines a suitable exhaust hood is sufficient to accomplish the desired result; others may have a barrier of such size and shape as to provide ample protection; while, in some cases, devices are used which will necessitate the operator being at some distance from the dangerous parts while operating machine. The use of special clamps or other devices for handling the stock being fed is another method which is satisfactory for some classes of work.

Every effort should be made to guard all possible dangerous parts on machines, and the foreman should carefully instruct the workmen in the proper methods of operating them, and emphasize the importance of close attention to their work.



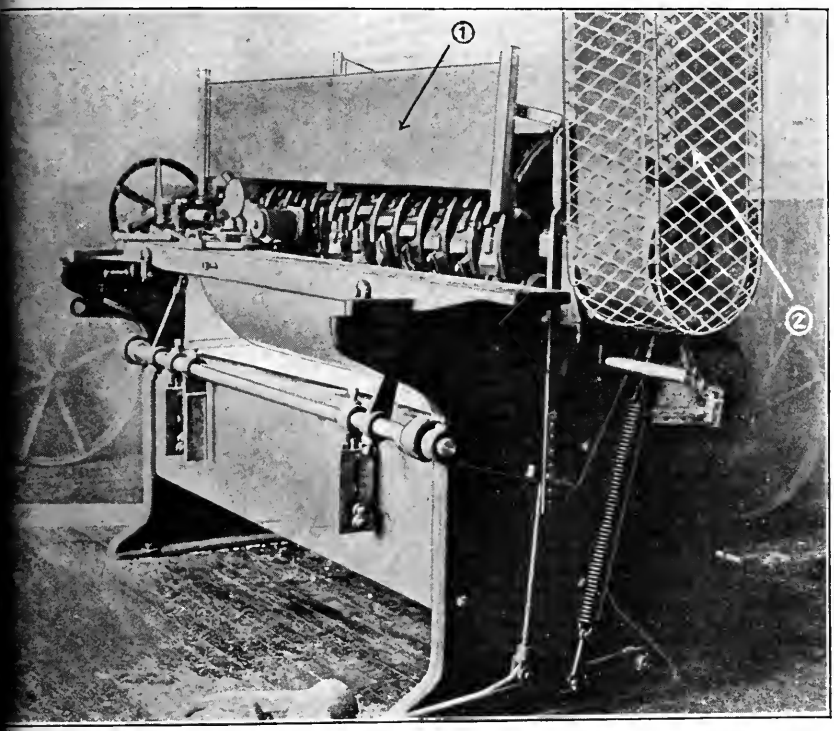
AUTOMATIC LATHE

1. Effective guard over cutter.
2. Driving belts, pulleys and all other moving parts guarded to standard.
3. A block beneath treadle to prevent accidental starting of machine.



AUTOMATIC LATHE

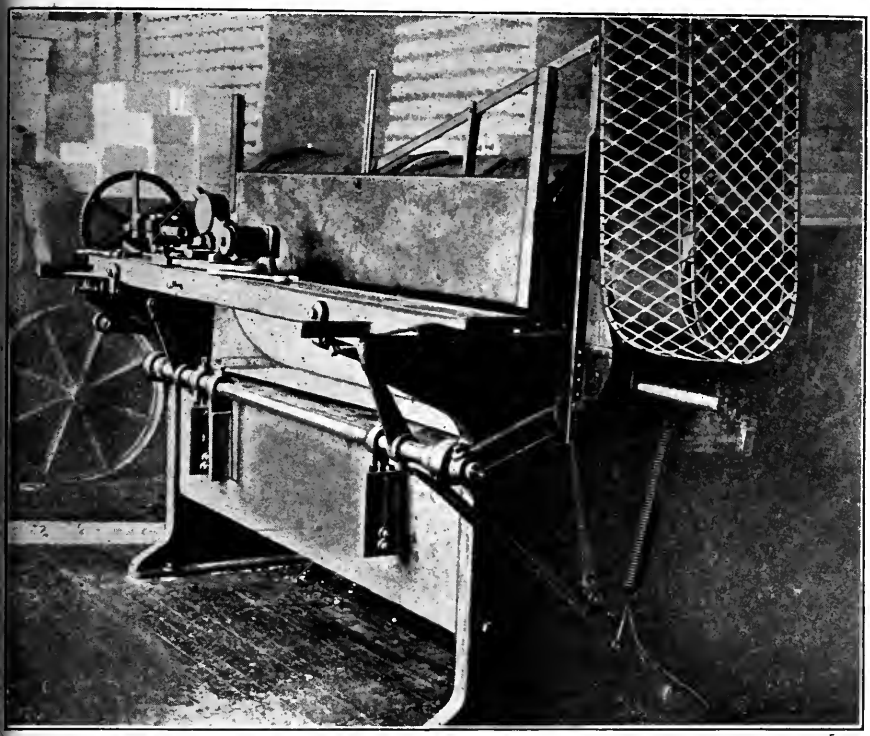
1. Cutter blades guarded while stock is being handled.
2. Belts and pulleys guarded to standard.



AUTOMATIC LATHE

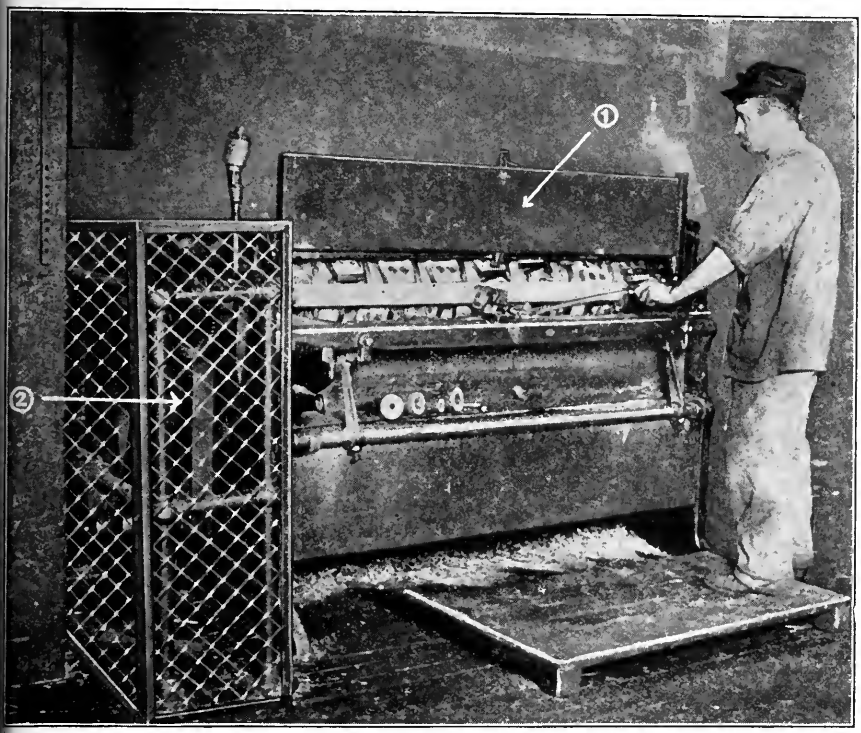
1. Point of operation guarded. Guard raised by treadle, which swings stock into cutting position.
2. Belt and pulley guarded. Mesh too large.

See Industrial Standards—Section I—Page 7.



AUTOMATIC LATHE

Same machine as preceding cut with guard lowered. Guard automatically returns to this position when pressure is removed from treadle.

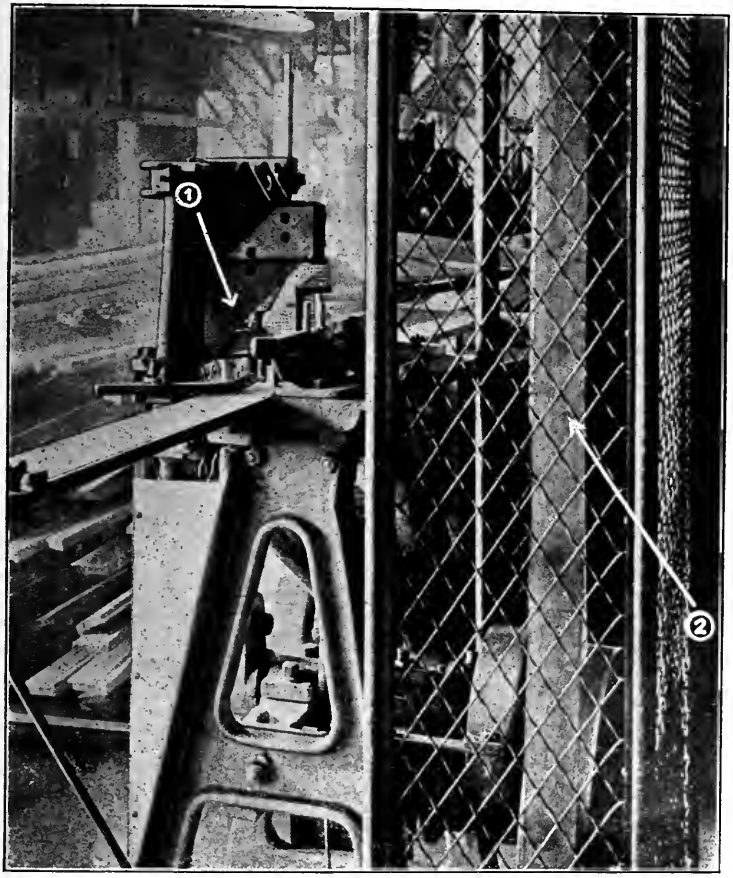


AUTOMATIC LATHE

1. Point of operation guarded. Note that foot of operator is holding guard in raised position.

2. Moving parts guarded. Mesh too large.

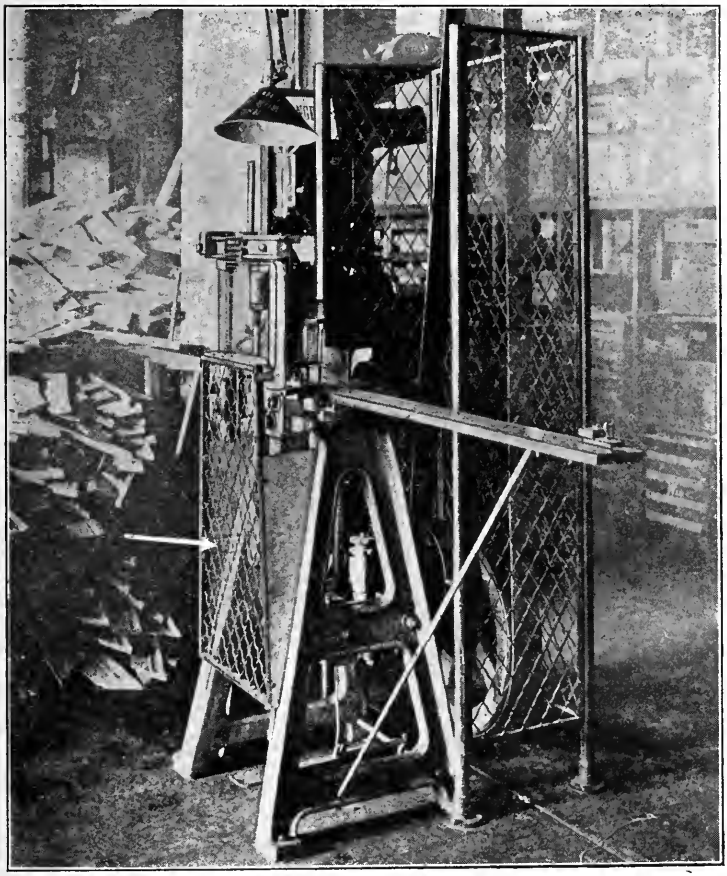
See Industrial Standards—Section I—Page 7.



MITER CHOPPER

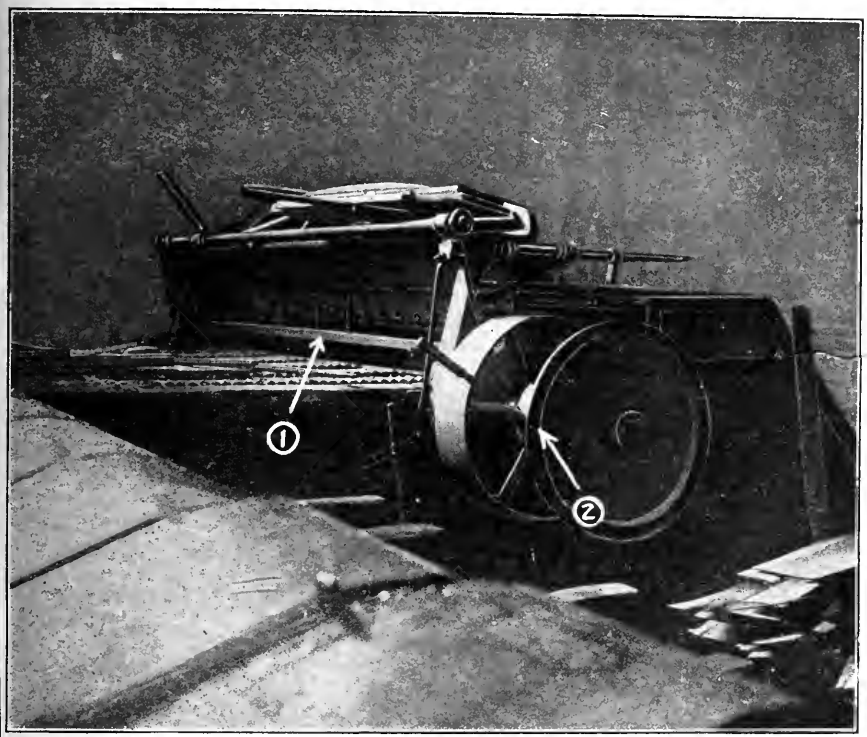
1. Point of operation guarded.
2. Drive belt guarded. Mesh too large.

See Industrial Standards—Section I—Page 7.



MITER CHOPPER

Note guard for crank.



VENEER CLIPPER

1. Automatic guard for point of operation.
2. Belts and pulleys exposed, should be completely guarded to standard.

See Industrial Standards—Section I—Page 7.

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